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innovate to Impact

Compendium *of* Execution Protocols *for* IDP/UDP *and* Allied INNOVATIVE EFFORTS Associated *with* Final Year Projects *at* GTU

Gujarat Technological University
(GTU)

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Prologue

Gujarat Technological University has been consistently and systematically developing new paths to foster innovation. The efforts are unique in terms of scale of implementation and depth of impact. This has created a huge shift in mindset among all its stakeholders, to embrace innovation and adopt an entrepreneurial approach. In this compilation GTU Innovation Council shares the broad interventions in our academic system. One of the key areas in which GTU has taken leadership, is to attempt large scale pedagogic interventions to support innovation in final year project work with Industry Defined Projects (IDP) or User Defined Projects (UDP).

While most of the efforts have organically evolved to support the missing links in the innovation value chain around the final year project and research work in past years, they have been carefully tested and scaled every year covering nearly 40,000 engineering students. To enable this very interesting and unique experiment, the elite Innovation Council which I personally lead, so that no clearances and approvals are delayed, reports to me under Hiranmay Mahanta as the convenor. The Innovation Council has taken measures to ensure that deserving innovations and student teams get ample support to chart paths like "project to product" and "mind to market". While we know that every single project will not reach out to the masses, we ensure that a significant share reach the end user. We at GTU have developed various institutional mechanisms covering IPR, pre incubation, incubation, design etc as an outcome of the efforts mentioned in this compilation.

We believe that while a student learns during theory classes, integration of hands-on experience, is extremely valuable. The efforts mentioned in this compendium show how to give suitable exposure, impart skill and attitude to the student in order to solve real challenges of industry, market or society at large. This book gives an insight into various tools and mechanism which GTU has developed and deployed in six cycles. I am sure it will help students, faculty guides and college authorities to get a good clarity about the methodology and ensures that the projects are implemented with true spirit and efficiency.

We are proud to share that our projects have got wider traction from various state technology universities in the country and from national innovation policy circles. I urge each student, faculty member of GTU to take our combined efforts to new heights and create a new paradigm of innovation ecosystem involving the young engineering students.

I am particularly thankful to the entire GTU team lead by the Hiranmay Mahanta and Dr. N.M. Bhatt with help from Amit Patel, Karamjit Bihola, Raj Hakani and Jignesh Tank for their commitment and dedicated efforts.

I am confident that these efforts will add significantly to the call of Honourable Prime Minister for the missions of Start-Up India, Make in India and Skill India.

Dr. Rajul Gajjar
Officiating Vice Chancellor
GTU

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Introduction

GTU has been pioneering towards developing strategies and implementing them to promote culture of innovation and entrepreneurship right from its inception. Unique thing in this entire process has been the scale in which the efforts have been implemented and the amount of cultural impact it has created in past six years of efforts. While primarily the publicly funded innovation and Start-Up efforts in academia in the country has been seen across elite institutes supported by Govt. GTU's effort brings in inclusion and one of its kind in affiliated type university systems towards democratising innovation process . Whole nation today takes inspiration from the efforts being undertaken here at different level to implement the innovation and entrepreneurship agendas.

GTU was the 1st university who envisaged that by democratising the innovation process through all its affiliated colleges *(500 plus)* it can truly harness the creative potential of young minds in the state of Gujarat. While different approaches has been made at different places we at GTU predominantly intervened both at pedagogy level *(policy at university)* & process level *(at colleges/departments/others)*, various micro interventions across the innovation & Start-Up value chain has been tried across GTU. The concept of IDP/UDP was 1st time introduced in 2011 and we have done serious efforts involving 100s of students and faculty members to fine tune the processes. The primary agenda of the university was to link young minds to real life challenges of MSME and others and incentivise them through academic process through final year project works. While this gigantic task has been done with different level of rigour at different colleges/branches & even at individual team level of students we have gained huge insights from the efforts and its implication has been well noticed by state and national policy makers. While we were intending to drive innovation movement through final year project work to start with we have developed various other auxiliary supports to help innovative students at different point of the innovation value chain. The kind of processes and institutional mechanism which were developed to cater the above were uniquely designed catering to affiliated type university system after taking wide range of inputs from carefully done pilot experiments across GTU. Right from giving academic credit points to do innovative projects to develop processes like Industrial Shodh Yatra (ISY), PSAR, PDE, Design Thinking interventions, Patent clinics, Crowd funding support, Innovation exhibitions and awards etc. we have done massive efforts at university to create process innovations and variety of incentives to keep the momentum going so that the innovation culture not only get inculcated at grassroots but also attain its optimum goals.

While the idea was to create wide scale innovation literacy and enabling students to innovate, we have carefully developed pipeline to support most creative innovations/projects even beyond their project work requirement. To achieve the goal of "Mind to Market" / " Project to Product " we have also developed various mechanism to support those teams who want to take their work a step beyond their academic requirement in the form of patenting or starting a Start-Up based on their innovative projects. Many institutional mechanisms like CIC3, GTU Technology Business Incubator etc. have evolved in the course of time to support the student projects beyond their study requirement. The below institutional processes have evolved to support IDP/UDP activities in past six years. Some efforts are targeted to support students at mass and some are targeted support systems once the teams attain certain threshold level. We have always tried to develop the support systems in distributed fashion to create access equality.

The idea was to convert at least 1% of the creative projects done by final year students to solutions based on real needs done by more than 50,000 students in GTU every year. While many such interventions are done for catering to all BE students in past six years, this process has immensely harnessed the creative potential of innovative students in Diploma Engineering too. In fact there is a significant share of DE *(Diploma)* projects in the list of patent filed at GTU as compared to their BE and ME counterparts.

This reiterates our conviction that innovations can happen at all layer and locations and given a conducive policy and process support such creative youth can solve even century old challenges of our country. While students were encouraged to take a real life challenge from any source we have seen the MSMEs benefiting from this process in great way. This pedagogy of solving floor level challenges of the SMEs of India through engineering students of GTU via their project work has been appreciated not only in India but also globally both in industry and academic policy level. The whole credit of this entire achievement by now goes to huge pool of young students who participated in these endeavours and faculty members who guided them in due course. GTU also developed tools like PMMS and other such ICT facility recently to manage the entire process seamlessly and extend best possible external mentoring and guidance to remotely located students. All the above tools and GTU protocols/policies culminated into a new innovation paradigm in past six years of experiments. The impact of all your efforts bagged more than half a dozen national innovation awards by now. While a great deal of efforts are yet to be done further to fine tune every step, it's the colleges, students and faculty members who hold the nerves of this entire movement will play crucial role in days to come. While our goal would be to introduce further support systems, we also need to optimise every policy goals which have been intervened by now.

To monitor the overall processes GTU Innovation Council, Sankul, GTU Innovation Clubs, industry associations and wide range of stakeholders have done gigantic efforts both in top down and bottom up manner. This compendium is compilation of all the tools and guidelines which were designed to support the entire IDP/UDP process by now. We have considered the 2016-17 academic year guidelines as inputs for it.

The Concept of IDP and UDP at GTU

The Concept of IDP and UDP: Every student of GTU is creative enough to solve real life challenges.

GTU wants the projects to be socially relevant and/or to be able to meet industry's or user's requirements. The users of an engineering product or process may be MSMEs, Large Scale Industries, Informal Sectors, Expert Individuals or Institutions.

GTU requires that each team of students should interact with the user of their choice and map the unmet needs of respective users. The need may be for improving a product or a process. Or it may be required to develop a new product for satisfying the need. The team of students will develop the improved or a new product or process as their final year project, with the approval of the faculty-guide.

Industry Defined Project (IDP):

The students are required to form teams of 3-4 students *(in general)* for working on their final year project. With the guidance of a faculty member, they will start working to find a problem, the solution of which would constitute their final year project. The problem may be found by studying the products or processes of an industry through a Shodhyatra or student can also take problem statement from International and National Competition *(in such case, prior permission from guide is required)*. A project based on such a problem is called an **Industry Defined Project (IDP)**.

IDP is a project, which is designed to improve either a product or a process in either forms/ features/functions based on a real life challenge from an industry. Dedicated hours have been allotted every week for all branches for interaction with industries and for working on the IDP/UDP. The term depicts that the projects is to be anchored upon an industrial use and it is to be done under the guidance of both an internal guide at the college and an external mentor from the industry. However whether the definition is appropriate for a final year project is to be decided by the faculty only and its related issues will be binding to the students group.

User Defined Project (UDP):

Alternatively a project may be based upon the needs of NGOs, informal sectors, Govt. organizations and society at large. Students can take a research problem identified by the faculty members or it could be the idea of student, which is approved by the faculty guide. Such a project is called a **User Defined Project (UDP)**.

Notes:

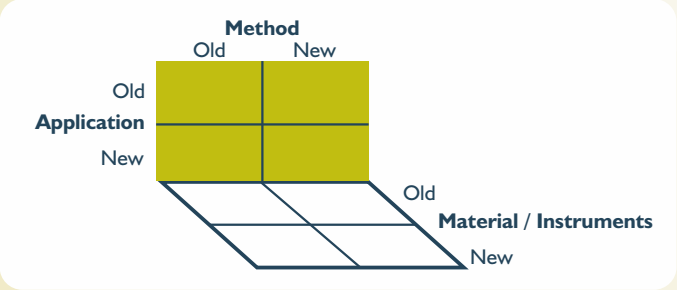
- IDP/UDPs/Research Projects in the curricular is to make sure that students do some innovative work, which can be related to the product/process within/outside the industry. Or the IDP/UDPs/Research Projects may be based on some unsolved problems of the society.
- Innovative work can be defined as attempting different things in different ways and making a difference.
- A final year student at GTU may work on one of the two types of projects, as a part of the requirements for the Degree/Diploma. The two types are IDPs or UDPs.

- The final year project is divided into two semester(7th & 8th)
- Both IDPs and UDPs will follow similar procedures (protocols) and in both the cases the authenticity of the project is to be verified by the internal project guide.
- The Project may be done at either the college or at the industry according to the inputs from the internal guide.

- If some projects need more than one year to reach to a stage of final product *(ready to be used)*, the teams and guides can carry forward the same project, in subsequent years, exactly from where it had been left by the previous teams. GTU believes that in such iterations and cycles, many final year projects can become useful products for end users.

WHAT IS AN INNOVATION?: It has been suggested that, if one codified a particular challenge in a particular environment and tries to make new interventions, either in material, method or application, then it can lead to an innovation.

"Conceptually, any innovation implies substantial improvement in the ways of doing things, producing goods or providing services. It may involve a new use of an existing resource or producing (or delivering) existing goods or services through new methods *(or new instruments/materials)*" *(Gupta, 1992)*



To develop inclusive innovations, one needs to develop solutions pertaining to a specific challenge and look for how he/she/they can develop interventions which can cater to a different:

a) space **b)** sector **c)** social engagements **d)** skill sets and knowledge

Guides: A faculty from the educational Institution of the student will be guide for project. The industry persons or any other experts can mentor projects. (For some projects, multiple guides can be taken.) During the final project examinations, the projects are evaluated by a group of two examiners consisting of an internal examiner and the external examiner appointed by the University. However for a project, based on an IDP, the Principal/Director of the educational institution should invite the Industry mentor/guide to join the group of examiners for evaluation of the project, as the 3rd examiner.

The final year project done by a team of students/individual student should be such that:

1. The industry or other users who gave the challenge start using the solutions;
2. The technology got transferred to the industry or other industries through transfer of IP or as open source technology;
3. The team takes the innovation ahead to build a concrete product, bench-marked and tested by a competent authority;

4. The team initiates a Start-Up, based on their IDP/UDP, either while studying or soon after they graduate;
5. The team gets national or other recognition, awards, investment support, resource support, publication in a reputed journal/conference;
6. The team/ mentor industry files a patent with genuine novelty, the team will be given an Award by GTU for the outstanding project. *(Every such project will be evaluated through proper indicators in any of the above 6 cases for the Award.)*

Wherever feasible the students have to demonstrate a proof of prototypes/working model during the final examinations. Each team has to keep all their progress documented while working on the project.

The following entities must not be used as industries for IDPs:

1. Businesses or industries having no concrete product/service delivery track record,
2. Institutes, which are mainly in the business of giving training or providing coaching on various technical skills within or outside syllabus ,
3. Vendors/Institutes which make prototypes of various concepts and demonstrate to students as a part of training to serve their academic needs.

Such projects will not be accepted by concerned department even if the business/industry/institute is a registered unit. GTU welcomes the involvement of genuine industries with the Colleges/ Institutions/Polytechnics. **However businesses, which sell ready-made projects to students and which make it possible for a student not to apply his own mind and hands for working on the project must be avoided as a plague for technical education.**

Standard Operating Procedure (SOP) of GTU Innovation Club

(Phase-1, BE Stream)
http://www.gtu.ac.in/uploads/15092016.pdf

Now mandate of UDISHA club has been rejuvenated as GIC (GTU Innovation Council) Club, for more detail please refer: *http://www.gtu.ac.in/uploads/04082016.pdf*

GTU Innovation Club: Introduction

Innovation is the key for every economy to grow, and it happens at every layer of the society. Youth of the country and the university system play a crucial role at every step to shape the innovation ecosystem. Recently as per the Global Innovation Index 2016, India has improved its global ranking by 15 places. Honorable Prime Minister of India has declared decade of innovation 2010-20 to unleash the creative potential of every Indian and contribute at all layers. National Innovation Council was set up and chaired by Advisor to PM, India in 2010 and recently Atal Innovation Mission has been set by Govt. of India under NITI Aayog to spearhead innovation movement across the nation. GTU is the 1st large scale affiliated type technology university in India, which has established 1st of its kind University, based Innovation Ecosystem since 2010. The efforts and processes developed at GTU Innovation Council have inspired many universities, states and national policy makers to try similar efforts contextually.

Refer key efforts at GTU Innovation Council: ***http://www.gtu.ac.in/uploads/04082016.pdf***

Innovation processes at GTU are primarily integrated at three layers:

A) At university level through GTU Innovation Council
B) At regional/cluster level through 25 GTU Innovation Sankuls
C) At college level through GTU Innovation Clubs.

The university has developed various processes and pedagogies related to innovation which are being executed at all of the above three layers with GTU Innovation Club playing a crucial role in making this happen at grassroots level. As per the previous guidelines and efforts, GTU affiliated colleges are required to set up GTU Innovation Club involving students and faculty members to execute the innovation, Start-Up, IPR, research and allied efforts at college level. This guideline will further synchronize the efforts towards the larger goals.

To further streamline the efforts related to innovation, each Engineering college affiliated to GTU is required to rejuvenate their innovation clubs as per the given guidelines and structure. GTU has functional innovation clubs across most of these colleges since 2011. As there are many activities which are mainly focused in the area of IPR, Design, Innovation, Start-Ups, Leadership etc, university has now started to streamline all these student lead efforts through GTU Innovation Clubs. This will help in optimizing the efforts and impact to achieve overall objectives of GTU

The above innovation clubs will play a role of key stakeholder in innovation ecosystem at GTU to conceive and deploy the innovation, entrepreneurship, research and other strategies centered on students across all branches of engineering and years.

GTU Innovation Council will coordinate the process of capacity building of these clubs and their members and provide necessary innovation and entrepreneurship related toolkits. The role of these clubs has been to conceive, test and design local as well as central action agendas and implement them in agile fashion. These Innovation Clubs will take care of all the efforts across the innovation, skill development, entrepreneurship value chain as defined by GTU Innovation Council.

These clubs are also mandated to implement the agendas as described by National Innovation Clubs declared by Hon'ble President of India.

To nurture creativity GTU Innovation Council, GIC has been discussing with all colleges one-by-one to explain about the importance of establishing a GTU Innovation Club and keeping it very active throughout the year. Every Club is managed by the students, with the guidance of the designated faculty members. It keeps the students more involved with having an environment of creativity at their College.

Architecture of GTU Innovation Club

- Every college will have the current Principal/Director as Patron of the GTU Innovation Club. He will guide the club in executing all its activities as per the guideline given by GTU.

- The Patron will appoint one overall faculty coordinator for the club who will act as GTU Innovation Club faculty coordinator for over all efforts in the college. *(faculty member with leadership skills who enjoys the confidence of students and other faculty members should be preferred)*

- Each college has to nominate one faculty member each for overseeing efforts like below: *(Recommended that faculty should be from different departments based on their interest and skill set. Such Members will actively work in respective activity head and mentor the efforts.)*

    1. Faculty Coordinator for Community Outreach, Social, Cultural & Allied Initiatives
    2. Faculty Coordinator for Entrepreneurship/Start-Up Related Efforts
    3. Faculty Coordinator for Technology, Research & Development
    4. Faculty Coordinator for IPR, Innovation, Ecosystem Development
    5. Faculty Coordinator for Public Relation, Coordination and Communication
    6. Faculty Coordinator for Industry Relation, Skill Development, Placement

- Since every GTU Innovation Club establishes a close working relationship with leaders of industries through the local GTU Innovation Sankul Committee, through establishing contacts at the departmental level with mentors for Final Year Projects and through its efforts to continuously invite industry professionals to the class-rooms, a Placement Committee and the TPO may be important parts of the Club. *(Preferably TPO in charge of the college can play role of Faculty Coordinator for Industry Relation, Skill Development, Placement.)*

- Every class under each department will also nominate one student from every year *(1st to 4th for Degree Engg.)* as a part of this club. Every year the club has to be rejuvenated by inducting new members. Best performing student members can be retained in the club in subsequent years.

- Each Club will have six student Vice Presidents (VPs) of each sectors as shown in chart (1), *(preferably with equal representation of all genders selected from overall list of club members)*. *(Example: For the head of Entrepreneurship, there will be one faculty coordinator and one student vice president to oversee efforts.)* Each student VP will be nominated for one academic year. All the VPs will assist the GTU Innovation Club Coordinator and all the members of the Club will work as a team, under the leadership of the GIC Coordinator and the Vice Presidents in planning, strategy and execution.

- Preferably, the student Vice President must be of 3rd or 4th year. The students will represent their head in every single endeavor at GIC at College and University level. Students having leadership, technical, managerial skills with inclination towards innovation, entrepreneurship or suitable skills are to be given preference while forming the Club every year at College level.

- Under each vice presidents of each sector there will be four Student Sub-Coordinators from each year *(Recommended that Student Sub-Coordinator should be from different departments to have inclusion of all sectors and years)*. These sub coordinators will be picked up from the list of club members nominated by all branches as members of innovation club.

- Other student representatives of each GTU Innovation Club will remain as general club members and help in executing key efforts of the innovation club in the respective college.

NOTE:

1) Professional Societies *(e.g. ASME/ACM/IEEE/SAE, etc.)*, their student club core co-coordinators should closely work with respective faculty head under GIC Club and Student Vice President of Technology alongside their efforts in respective hobby clubs.

2) Other hobby Club Activities (E-Cell/Placement Cell/ALCE/Media Club, etc.), their student club core co-coordinators from students should closely work with suitable heads under Innovation Club.

3) Open Source Technology Club, Mobile and Wireless Technologies Club, S4 Extension Center and any other hobby Club or Co-curricular Club based on GTU efforts of the college may have representatives in the GTU Innovation Club at College level in addition to the members selected as above. Such initiatives should closely work with suitable heads of GIC Club to synchronize overall efforts.

4) The hobby club student members can benefit from 100 activity points, Link:- ***http://files.gtu.ac.in/circulars/15DEC/16122015_01.pdf***

Role of Student Vice Presidents (Vps) under guidance of their respective faculty coordinator

Student Vice President, Industry Relation, Skill Development , Placement,

- Execute key efforts related to GTU Innovation Sankul, *http://gtuinnovationcouncil.ac.in/*
- Execute key efforts related to ITAP, *http://www.gtuplacement.edu.in/*
- Coordinate Skill Development related interventions
- Coordinate the part of IDP/UDP efforts related to industry linkages like Industrial Shodh Yatra, industry-academia interventions at various stages etc.

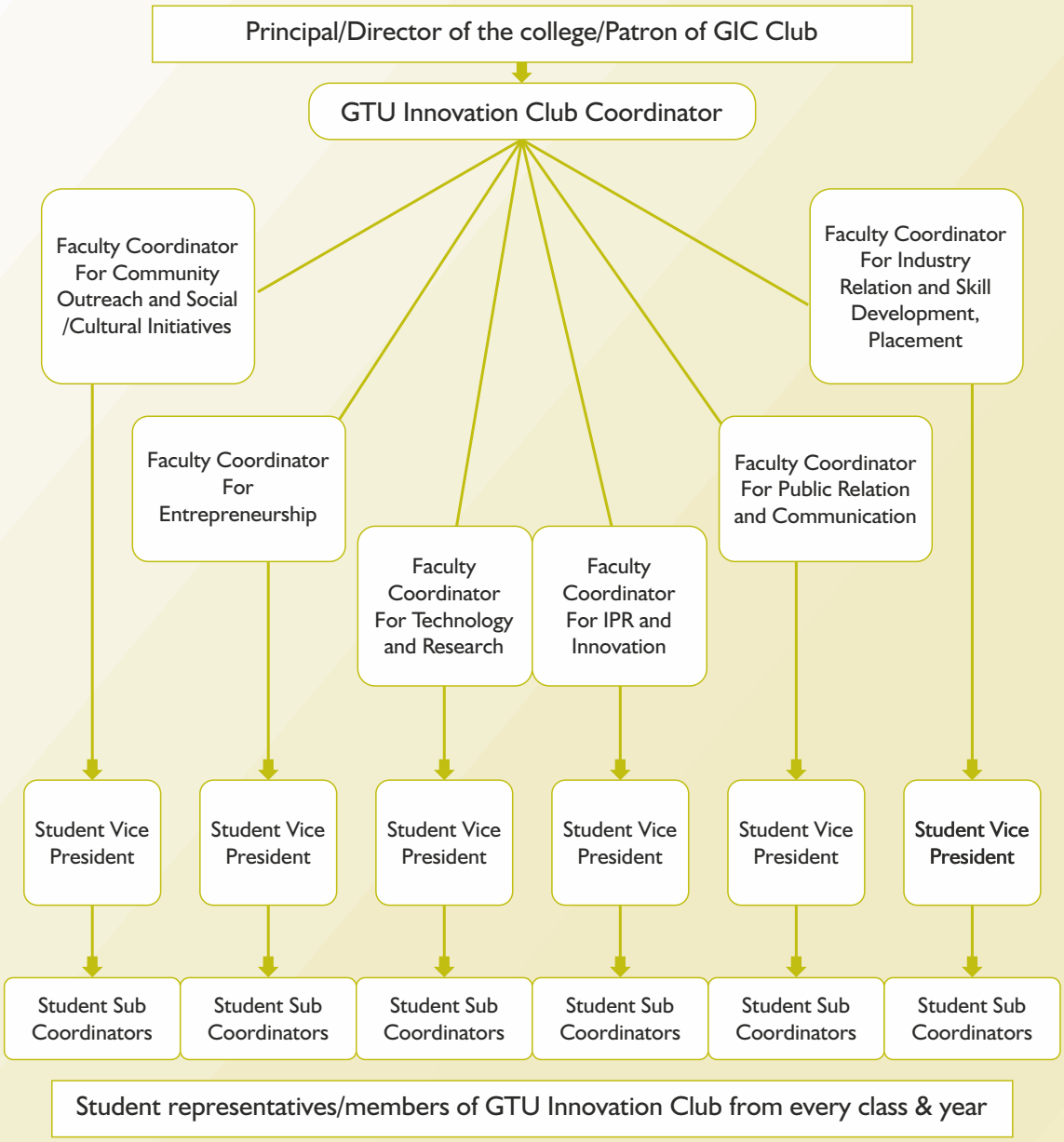


Chart - I

Student Vice President, Technology and Research & Development

- Execute key efforts as mandated by CiC3 at GTU, ***http://cic3.gtu.ac.in/***
- Coordinate efforts related to technology based events, design thinking, professional society, technology hobby club activities etc.
- Coordinate efforts like project to product, tech-fest, conference, seminars and interventions related to new R&D

Student Vice President, Public Relation, Coordination and Communication

- Coordinate internal/external communications and over all coordination of club activities
- Document every efforts and share with suitable platform, web, outreach ,e.g contribute to GTU news letters on student efforts or similar platforms
- Marketing, branding, web management and sensitizing all efforts of respective Innovation Club/college
- Coordinate and outreach to every student and internal stakeholders to share update & engage with efforts of GTU Innovation Council & GTU at large

Student Vice President, for Entrepreneurship/Start-Up related efforts

- Execute ground level efforts to implement GTU student Start-Up Policy, ***http://files.gtu.ac.in/circulars/14DEC/05122014_02.pdf***
- Coordinate entrepreneurial initiatives involving students and other stakeholders
- Coordinate local student Start-Up related efforts

Student Vice President, for Community Outreach, Social, Cultural & Allied Initiatives

- Coordinate all efforts of social initiatives by students, departments and college
- Coordinate efforts related cultural creativity and community driven initiatives. Also efforts like NSS, NCC and similar endeavors can be done.
- Coordinate efforts in Rural and other similar efforts beyond regular technical education, e.g. ***http://vy.gtu.ac.in/***

Student Vice President, IPR, Innovation, Ecosystem development

- Execute key IPR efforts related to students as attempted by GTU, ***http://www.gtu.ac.in/uploads/GTUIPRMissionBooklet_13082016.pdf***
- Execute key efforts around IDP/UDP, ***http://www.gtu.ac.in/uploads/GIC%20Compendium%20IDP-UDP.pdf***
- Coordinate in building local innovation ecosystem through various interventions as suggested by GIC/GTU.

How to Execute

1. Every Principal/Director of affiliated BE College to receive all guidelines / information/ outreach materials like PPTs and other docs from GTU Innovation Council and revert back for any clarification and support. Disseminate/present that information/PPT to students/related stakeholders in college.
2. Director/Principal Share all related materials with students, faculty members so that interested student, faculty member can show their intent to contribute to GTU Innovation Club. Principal's office or suitable designated authority can coordinate to start with.
3. Director/Principal nominating GTU Innovation Club Coordinator *(If college is already having club, then they may or may not change their faculty coordinator)*.

4. College Principal/Director to nominate six faculty coordinator as given above based on their interest/skill sets.
5. Internal process to be done in college so that student members for the clubs are selected through suitable mechanism *(college can adopt own ways but to ensure that capable and interested students from the college/branch get picked up in final club member list. Internal process could be recommendation, interview, based on past activity etc.)*. Colleges need to take utmost care to pick the right students for right task/head, not necessarily based on academic performance.
   [The Principal/Director of the college may put up a notice, asking students to nominate them to be members of the club. Every nomination should be accompanied with a Statement of Purpose, stating what the nominee would be able to contribute to the Club, the College and to GTU Innovation Council]
6. GTU Innovation Club Coordinator to upload details of club members at ***http://gtuinnovationcouncil.ac.in/gicclub/*** by 25th September 2016. GTU Innovation Council will mail the log in and password to each college principal/director to edit the data of each club at GIC portal. Each college/innovation club can update these information time to time as and when required.
7. GTU Innovation Council will do capacity building workshops for GIC faculty coordinators as well as student VPs and share them all toolkits and materials to execute things in colleges.
8. GTU Innovation Council will provide necessary content to the faculty coordinators and the Student Vice Presidents of the specific domains on the basis of which the vice presidents have to hold sessions and event in the workspace provided by their college to start with.
9. Every fortnight the club members will meet internally and plan activities and share progress with internal and external stakeholders. All GTU Innovation Club members must meet at least twice in a month *(The date to be fixed by the College/Institute)* and submit the monthly report of the activities to GTU Innovation Council on this mail ID: ***gtu_innovation_council@gtu.edu.in***. Each Club can share their monthly efforts/impact to GTU Innovation Council authority so that they can be shared on GIC website for wider appreciation and references/motivation for other GTU Innovation Clubs.
10. Each innovation club will keep in touch with the GTU Innovation Sankul Co-Chairperson (Industry) and other industry members on the Sankul Committee. They will also maintain connectivity with the team members of other innovation club members of nearby colleges, particularly those belonging to the same GTU Innovation Sankul.
11. The Coordinator should make a list of innovative projects, completed or currently underway; by the students and inform GTU Innovation Council. GTU will be able to bring recognition to the student, the Department and the College by showcasing the projects at the state or the central level. Other supports like Design, Funding, Prototyping, IPR support, Start-Up support etc. can be extended to such innovative projects based on recommendations by particular innovation club authority.
12. Each GTU Innovation Club will work jointly with GTU Innovation Council for implementing the proposed innovation and entrepreneurship program including, skill building, design, IPR, Ecosystem building, technical events etc. at the college level. The club will also work to participate in such activities at the Sankul, at the zonal and at the University level.
13. College Authority/Director/Principal will allocate a physical space where regularly the GTU Innovation Club can meet/work and execute things. Colleges are required to extend basic facilities with infra for this so that students and other members can comfortably work and achieve the targets in time bound manner and attain optimum efficiency.

14. Student VPs, Sub-Coordinators and other members of GTU Innovation Clubs need to play an active role as a part of GTU Innovation Council and attend activities/workshops/events/session at GIC. By this way they get to know more about Start-Up/IPR/Innovation/Design Thinking and also let their peers know about it by organizing similar workshops at their colleges.
15. Each GTU Innovation Club can replicate some of the efforts like: ***http://www.gtu.ac.in/uploads/04082016.pdf*** and also conceive and execute some of the own activities and engage young students while executing them.

Incentives for Colleges

- Colleges will be able to develop a culture of innovation and entrepreneurship at their respective campuses which will enable better teaching learning process with practical skill development for students.
- Best performing GTU Innovation Clubs can fetch appreciation during GTU Innovation Sankul Day, ***http://awards.gtu.ac.in/***
- On GTU Innovation Sankul day best innovation clubs will be appreciated.
- Best faculty coordinators can be appreciated through ***(Pedagogical Innovation Award)*** PIA awards during above.
- GTU's Local Inspection Committee (LIC) will map the academic component and will give due weightage to colleges who have done thorough effort involving its GTU Innovation Club and allied activities. In fact, few portion of this LIC analysis is based on implementing the key goals as mentioned above to appreciate best implementing colleges.
- Colleges can avail best support systems directly through GTU Innovation Council at State and National L evel by linking its innovation council efforts with University level interventions.
- Capacity building of key stakeholders of the College/Innovation Club by GTU Innovation Council which will create distinct proposition for the institute.
- Colleges/Innovation Clubs can benefit from GTU and AICTE Start-Up policy interventions.

Incentives for Student Members of GTU Innovation Club

- Student club members can benefit from 100 activity point system by participating and contributing towards efforts of GTU Innovation Council. ***http://files.gtu.ac.in/circulars/15DEC/16122015_01.pdf***
  On successful contribution under respective roles the Student Members under the GIC club architecture will fetch respective credit points *(Student Vice President-15 points, Student Sub-Coordinator- 10 points and other members of the club- 6 points for one academic year)*. Note- Student VPs can avail the max points once *(as VPs will be changing year on year)* but others can avail their respective activity points multiple times if they continue to be a club member or sub-coordinator in subsequent years being a part of the GTU Innovation Club. Best performing student sub coordinators can be promoted as student VPs in subsequent years based on contribution in previous years.
- Each student member of the club irrespective of their role will get huge exposure through efforts at GTU Innovation Club which will add to their skill, aptitude and confidence.
- GTU Innovation Council will avail access to all its initiatives, events and programs free of cost to all GTU Innovation Club members and even incentivize some time if they perform outstanding in their role consistently.
- Student members can learn about various innovation and entrepreneurship processes at 1st hand and get real life exposure by implementing them at college level.

- Get exposure through other student coordinators from different colleges and at University level through lateral learning opportunity.
- Each club will be closely working with GTU Innovation Council and University authorities at respective level and hence will get ample opportunity to participate in doing grassroots level activities and help in shaping futuristic interventions in innovation and allied policies at University level.
- Develop leadership skills while executing the key goals at college and regional level which will help students to build a strong capability valued by society and market.
- Each student member will be distinct from their other peers as they will be fetching some of the unique skill sets which generally are beyond classroom learning.
- Cherish to have played a critical role in the innovation movement of the University and the country at l arge.
- Get to know about every intervention in innovation ecosystems nationally and abroad which will widen then vision for young students.
- While working closely in a team each student will develop next generation skill sets like co-creation, adaptability, institution building and many more.
- While being in college, get an opportunity to participate in many dimensions so that a student can get a chance to explore within him/her and outside world which will enable him/her to become a better professional in days to come.
- Each club member will get a direct chance to work with central team at GTU Innovation Council and harness the agenda of decade of innovation 2010-20 powered by youth energy.
- Student club members will be given preference while choosing students for various University teams for technical activities and other teams to represent university efforts at different stages.

Guidelines as Suggested by the Council of Deans

The students are supposed to scout for IDP/ UDPs before commencement of first semester of the final academic year. The student will take review inputs from faculty member, who is/are to be his/her/their Guide for the project and submit/present a presentation in power-point and document, in the format of (http://gtu.ac.in/udishapdf/IDPIndustryDefinedProject.pdf). (In case of a UDP, students have to fill user's detail in place of details related to industry) within one month of commencement of semester. (Team/individual will submit a report on the problem/project to the HOD. The IDP/UDP is mandatory for all branches.)

1. Each team has to present their IDPs/UDPs/Projects in front of their whole class and all faculty members of corresponding branch within one month of commencement of semester. Then, till the end of semester, students group will have to work on actual project tasks. The student group will be regularly visiting industry/meeting faculty guides as per time allotted in the time table, and will submit biweekly (as per college) progress reports to guides/mentors/ industries/college.

2. Colleges may invite other experts including industry persons; Sankul Co-Chairs /Directors of Sankul/faculties during these presentations. All the presentations have to be stored and maintained by respective colleges and departments. IDP/UDP reports of all the branches of the college are required to be uploaded on GTU PMMS portal, and same has to be verified by respective guide/HOD/Principal.

3. If the guides/HODs find during the presentation that the IDPs/UDPs are not suitable or is a repetition (done exactly the same thing in same manner before) or having not sufficient authentication about the industry who has provided the projects/problems, the teams may be asked to resubmit new definitions/value added definitions within 15 days. (The weightage is to be given based on the innovativeness of concept, originality of the concept and the usefulness of project)

4. If IDP is not of the required level, students may be asked to work on a UDP, defined by a faculty member.

5. The number of students per team for a project has to be decided by the college/ department/ project guides. (In specific cases the guides may allow inter department projects after mutual consent of both the department heads.) Team size should always depend on the size of the projects and required man-hours to implement the defined work.

6. Each team has to present (in report) their literature survey/prior art survey/ Patent Search & Analysis Reports (PSAR) of their ideas while presenting their IDPs/UDPs. If they are adding value to any existing product or process they might suggest the frugality/cost benefit or benefits to any common user or to any SMEs (Small and Medium Enterprises) through their IDPs/UDPs.

7. The teams have to be evaluated based on the credits as decided by university.

8. The internal evaluation of the IDPs/UDPs during 7th and 8th semester is to be done through continuous evaluation process at each department of respective colleges to gauge the efforts of students. The teams are supposed to keep their industries/users informed about their progress. The continuous evaluation/presentation is to be done once in a month/bimonthly as decided by the colleges. Departments may invite industry mentors to presentations and the opinion of industry mentors may be taken into account by internal guide for internal evaluation.

9. The industry guides/any other experts, who have helped in IDP/UDP may be invited to address students about the innovations adopted/needed by them during these presentations or in given time frame in the academic calendar for project.

10. While submitting the IDPs/UDPs as individual or as an individual/team has to submit a self-declaration form in the given format about the authenticity of the IDP/UDP to ensure that the project is being developed with the help of their guides (external/internal). The Head of Department and internal guide must not accept ready solution, prepared by a third party and presented by a student/team of students. In such scenarios the internal guide/Head of Department may cancel the project, at any stage, if proper justification cannot be produced. (A record of such scenarios is to be maintained at the department for reference of GTU)

11. The hard copies of the IDP/UDPs forms with self-declaration form (signed) is to be kept as record of the corresponding department of the corresponding colleges. (The soft copies is to be submitted to GTU according to the given format online after presentations/evaluation as part of final project report)

12. All student teams are must require to register and complete all tasks on PMMS portal during both semester, the same has to be properly reviewed by respective guide/HOD/ Principal. After which all students are must require to generate completion certificate and same has to be attached with their project report along with signature from their guide and respective HOD.

13. For Industrial Shodh Yatras (ISYs) Steps & Final Year Projects follow the steps as mentioned under "Four-Step Process for Defining a Final Year Problem Statement" part of this guideline document.

14. Kho-Kho model (relay) of projects can be allowed where a semi-finished project done by the previous year's students, at a particular department, can be adopted by the students of the next year.

15. Students who are working on projects related to VISHWAKARMA YOJANA, have to work as per instructions from their guide to cover all project activities.

The Process for Approval of the Project Definition

The process has been validated by a team of council of deans and faculty members from some of the colleges, affiliated with GTU.
http://www.gtu.ac.in/circulars/14Jul/07072014_01.pdf

The Process to reject the project definition and to ask a student to work on another project, if it's below permissible level has been defined through a six-point criteria.

Introduction: GTU is committed to ensure that every single final year project brings impact to a satisfactory level after year-long efforts of students. Every final year project is required to be innovative. It should not be repetitive or copied from previous projects. If the project definition, submitted by a student or a team of students, is found to be below expected quality, then the guide and HODs may ask the team to submit a new project with better possibilities.

During final project examination, many students are not able to get through the examination of the project. To avoid such issues, each team needs to carefully select the project definitions, do sincere efforts and make efforts to solve the proposed challenges. The faculty member, guiding the students, needs to ensure that the team of students under him does genuine efforts throughout the year.

The Process:
The students must meet and discuss the definition of their final year project with the faculty member-guide and get his approval by verifying to see that the following parameters:

1. The proposed project quality should be up to the status of a BE final year project quality.
2. The project should not be a conventional project and colleges can check past year projects at http://projects.gtu.ac.in/ or http://gtuelibrary.edu.in/ICSearch.aspx or at http://www.techpedia.in/search- projects or through any other sources.
3. The project should not be a purchased/3rd party developed project.
4. If the project is being carried forwarded from previous years then it must add substantial value to the previously done work on the project.
5. The project should be novel, original and having a possibility of good impact if the proposed solution get implemented.
6. Even if student claim it to be an IDP, it should not be based on industry whose main objective is to make final year project and give it to students. [1. Businesses or industries having no concrete product/service delivery track record 2. Institutes, which are mainly in the business of giving training or providing coaching on various technical skills within or outside syllabus 3. Vendors/Institutes which make prototypes of various concepts and demonstrate to students as a part of training to serve their academic needs]

7. The total EXAMINATION timing PER TEAM will be approximately 20 minutes including Presentation & Viva. Presentation has to be via PPT, preferably.

After the faculty member-guide, it is required that the team makes a presentation before an expert team and gets its approval. If majority of the team thinks that the proposed project is not appropriate for a BE/DE project, the Expert Team can revoke the project and ask the team of students to resubmit a new project definition within a stipulated time.

The expert team may comprise the faculty member-guide, a minimum of one expert faculty in the college other than the guide. It will be appreciated if the HOD of the department can invite one external genuine industry expert to join every expert team for reviewing the projects. (For identifying the industry expert, the HOD may consult the Co-Chair (Industry) of the College's GTU Innovation Sankul)

The University has provided for a number of hours every week for the project and the Faculty Member-Guide is required to monitor the progress of the teams of students, he/ she is guiding regularly every week. He/ she has to ensure that during the whole of the year, the team is regularly working on the project every week. He/ she also has to ensure that the team keeps the industry-mentor, if any, in active loop.

Self-Declaration Students of each IDP/UDP

(This has to be attached along with IDP/UDP report, while submitting the copy to university through PMMS portal and to departments in hard copy)

I/we

_____

_____ (Name of student/students),

the student _____of Branch, having enrolment number _____

enrolled at _____ (college name) hereby certify and declare the following:

1. I/we have defined my/our project based on inputs at

   _____
   (users name/industry/any other user like faculty or any other organizations) and each of us will make significant efforts to make attempt to solve the challenges. I/we will attempt the project work at my college or at any location under the direct and consistent monitoring of _____ (guides name/industry/user). We will adopt all ethical practices to share credit amongst all the contributors based on their contributions during the project work.

2. I /we have not purchased the solutions developed by any 3rd party directly and the efforts are made by me/we under the guidance of guides.

3. The project work is not copied from any previously done projects directly. (Same project can be done in different ways but if it has been done in same manner before then it may not be accepted).

4. _____ (Name of industry/user/self) to the best of my knowledge is a genuine industry engaged in the professional service/social organizations.

5. We understand and accept that he above declaration if found to be untrue, it can result in punishment/cancellation of project definition to me/we including failure in the subject of project work.

Name/Names: _____

_____

Contact number/numbers: _____

Date: / /20____ Sign/Signs:

Place: _____

What experts are expecting from students, who are carrying out project
Reference: *old.gtu.ac.in/circulars/14Jul/25072014_01.pdf*

"When you solve a real life challenge you not only become better engineering student but also you become a better human being "-

Prof Anil K Gupta, *Executive vice Chair, National Innovation Foundation (http://www.nif.org.in/), Member National innovation council*

Innovation and Learning can go hand in hand

Industry and society expect engineers to be able to communicate, work on multidiscipline teams, apply higher order skills such as designing, analysis and exploring alternate solutions. They should be able to learn and adapt to new technologies and unlearn outdated and obsolete methods.

This may sound a far cry from what you have been doing in your undergraduate years. But, in order to compete and succeed in a career spanning at least 60 years of your life, you will have to take a conscious decision to rise to the situation and start doing projects with a singular aim of achieving the graduate attributes that I have stated above. It is important to experiment, fail, retry and come to some solution through projects that have some value for the industry, society or the community. It is with this objective that GTU has designed the courses for Design Engineering and IDP/UDP. It is envisaged that your projects will lead you into the interesting realm of the real world. The real learning happens while exploring and designing the project, rather than a readymade project which is superior in looks and efficiency.

I hope each student takes back a unique learning experience through their IDP/UDP and leaves a foot print for coming generations to learn and carry forward the projects started by each one of you.

- Dr. Rajul Gajjar, *I/c. Vice Chancellor, GTU and Principal Vishvakarma Government Engineering College, Ahmedabad.*

Way to the Project

The project may be analytical or computational or experimental or combination of them based on the latest developments in the area of interest. You can apply idea into application through experiments and/or simulation. It will also help you to decide the topic for further research work in your life. Through the project, you are supposed to learn more than one or all of following attributes.

- Problem formulation techniques
- Identification of scope and objectives of research work
- Associated administration for project work
- Writing skill & Presentation skill
- Report preparation techniques
- Fundamentals, information, reviews & in-depth knowledge in the desired area
- Analysis techniques of published data
- Techniques for the design of experiments
- Development of compilation skill
- Technical Paper writing

It is worth noting that for any placement interview after graduation, the interviewer mainly focuses on BE project and so with paid project you will suffer a lot.

- Dr N M Bhatt, *Director, Gandhinagar Institute of Technology*

A big & radical change usually begins with a small genuine idea

The university brings you this huge opportunity to make your mark at the industrial world, by unleashing your creative and fresh skills, while you are still connected to your institute with theoretical & technical support! A big & radical change usually begins with a small genuine idea, expressed as a project document. A novel project has always drawn attention of the industries. Historically, the list of success stories features such creative project idea providers.

I strongly urge all you final year students to make this huge opportunity count by carrying out a novel and meaningful project during this crucial final year. I am sure you will refrain from all pseudo project concepts and purchased projects, for, it can NEVER create the difference that a genuine idea can! Wish you all the success!

- Prof. P.C. Vasani, *Principal, Lukhdhirji Engineering College, Morbi*

Magic Spell of the successful project with good score – "search innovative project during summer break June-July within surrounded industries "

The career opportunities are primarily based on the project innovations.

On completion of six semesters, students have to work on project in three parts:

1. Students have to search innovative project during summer break June-July within surrounded industries, faculty expertise or exploring international contact (GTU is giving opportunity for the possibilities of student's international experiences in Canada, USA, Germany and UK Universities).
2. During 7th semester student have to identify the project, define IDP/UDP, start literature survey, patent survey and prepare the preliminary model to start investigations.
3. During 8th semester student prepare the prototype test for investigation, establish the results, conclude the innovations, attempt for publication and patents.

College and faculty needs to promote this exercise to identify the project with a novel idea among students. If student does the above exercise successfully to work on a novel innovative project, scoring the project evolutions is the primary advantage, along with the job opportunities.

- Dr K N Mistry, *Dean, Faculty of Engineering, GTU and Principal, GIDC Degree Engineering College, Abrama, Navsari*

A project which can be patented

The final year under graduate program is to show the ability of the students to apply his/her knowledge in the domain to create an outstanding engineering product with an innovative concept. The students must put all efforts for bringing an engineering product in the form of his/her project with the support from industry professionals, GTU innovation council, Institute and faculty members which can be patented.

- Dr. Axay Mehta, *Director, Gujarat Power Engineering and Research Institute*

Don't go for purchased projects or paid projects.

Today's India is fast emerging as a destination for world class Research and Development Centers and Innovation hub. Young friends, these are the signs of even a brighter tomorrow for India and its people. You must, therefore, be highly excited to make your own contributions to the growth and development of India of your dream. At SAL Technical Campus, we have a tradition of nurturing leadership qualities alongside developing capabilities to challenge the state of art technologies. This we do by inspiring you to involve into a whole lot of innovative projects being pursued by the inspired student community under the guidance of their faculty mentors. Don't go for purchased projects or paid projects.

Let you empower yourself with the Wings of Knowledge and Power of Innovation and with this Empowerment imbibe an attitude akin to a positive and proactive thinking, caring concern for men and nature and above all, an eagerness to serve and excel in your chosen domain of activity throughout your lifetime.

- Dr.Rupesh P.Vasani, *Principal, SAL Institute of Technology*

"There is no shortcut to success and no alternate of handwork"

Of all the new ventures and initiatives taken by Gujarat Technological University, according to me, the most beneficial policy/implementation directly applicable to students is that of IDP (Industry Defined Problem). The industry complains about less employability of engineering graduates, whereas the students crave for practical industrial exposure to reinforce their theoretical knowledge. GTU has done an awesome task by solving, these complementary problems by bridging them through IDP. Students solving industrial problem- a widespread trend in the developed countries. It's like an crude diamond, whose value have not been realized, due to the ignorance on the part of students about its innumerable benefits like industrial exposure, developing practical skills, creating rapport with industry, beneficial for placement, grooming of technical skills and many more….
The students who prefer to put "old wine in new bottle" by just copying earlier works are actually keeping themselves deprived of this wonderful opportunity.

So I would like to personally request all the students to take a taste of IDP/UDP and experience its rich harvest.
Best wishes… …

- Dr. Sachin Parikh, *Principal, V.V.P. Engineering College, Rajkot*

Don't be afraid of failure

The genuine efforts from Diploma engineering students will only be appreciated in terms of the awarding marks/grade for IDP/UDP. The students should observe real life problems of the industries/ organizations in their surroundings. Take it as a challenge and provide innovative solution. Don't be afraid of failure as it is the policy of GTU to appreciate failure even if it is full of efforts, if it is a great learning experience which is more than success and if it is full of genuine and innovative efforts. The copy/paste of ideas/circuits/models/projects are not going to be considered as great work, on the contrary the student may be at loss in getting marks/grade at the time of evaluation Your genuine innovative effortful work can be a great support to your surrounding as well as to you as a student which may help in transforming your career into top gear as an engineer. Be genuine in work - don't Copy, trust yourself and your capacities.....you will surely come up with miracle.

- Dilip Ahir, *Associate Dean- GTU-Zone 4, Group of Colleges*

Say NO to plagiarized projects

It is of prime importance that each student of final year will do IDP/UDP with great enthusiasm and integrity. The idea of giving so many man hours in the university curriculum for this purpose itself speaks about its importance and the value addition it has to the overall development of the student in terms of ideation, observation power, conceptualization, identification of technical rigor, time management for desired outputs, analyzing practical results, application of theoretical considerations and presentation skills. All these values are lost when a student purchases projects from so called 3rd party providers who are playing with the careers of students. I would strongly suggest to all students to refrain from such activities. These plagiarized projects should be rejected by the university.

- Dr Praful Bharadia, *Principal & Academic Co-Chairman, Mehsana Sankul, Saffrony Institute of Technology*

Take a novel idea by literature survey and make a real life useful project

The project will make it easy for you to smooth out the transition from academic to professional environment. The project made in one year, giving everything that you have and understanding everything that you utilized, would give you a sense of self satisfaction and would increase the confidence within you.

So I suggest you that take a novel idea by literature survey and make a real life useful project that gives you a sense of belonging ness of that project.

- Dr. Ashish M. Kothari, *Assistant Professor, Atmiya Institute of Technology & Science, Rajkot*

Trying for solutions of industry problems, you can learn a lot.

I am very happy to inform you that you are on the verge of completion of your bachelors of engineering within a short time (one year). As on current status of educational system there is a lot difference between our syllabus and industry needs or challenges. Through IDP, you can observe the working conditions in industry and their problems. By trying for solutions of those problems, you can learn a lot about the field. But please make sure that this genuine way is little longer and tougher, but there is no any shortcut of any success path. We can provide you IDP / UDP topics in our/any college, if you are not in a position to find out or get permission for IDP work. I humbly request you all too please do your own work and get success in life.

- Dr. V M Patel, Principal,
Shanker Sinh Vaghela Bapu Inst. of Technology, Gandhinagar

Innovate something to leave your own signature in the end.

As students final year project is for one year duration but as a future engineer it is for lifetime. So, let us take this challenge with great sincerity and commitment that you will innovate something to leave your own signature in the end.

Project Milestones:

ShodhYatra --> Problem --> Patent Search & Review --> Objectives -->Innovation --> Product --> Patent --> >Enterprise

- Dr. R G Kapadia, *Principal (I/C), Mechanical Engineering, Shri S'ad Vidya Mandal Institute of Technology, Bharuch*

Select the project of your self-interest and industry requirement

As Steve Jobs has rightly said "Stay Hungry, Stay Foolish" is true for final year project. There are some simple things one has to keep in mind for selection and implementation of their project. Select the project of your self-interest which must synchronized yourself with industry requirement and in turn creates job opportunity. At the end of the day market your project by national and international exhibitions show casing, showing to industry expert and by use of social media. All the Best

- Dr. Mitesh Popat, Principal, *Sanjaybhai Rajguru College of Engineering,Rajkot*

You can get a job at the same place where you have done your project.

The jury from past experience always comes to know that whether it is a 3rd party project or you have done on your own... If you are doing your own project, You learn to work in a team, share responsibilities, meet time deadlines of your guide, go to different places for getting the material, visit industries & interact with Senior Engineers, prepare reports, etc.

If you are into Computers / Software, you will inevitably get a job at the same place where you have done your project.

Determining by what process the work will be carried out; planning the detailed phases of the project; adopting one or more design methodologies; analyzing requirements; using (or constructing) tools; construction of one or more art efacts (hardware, software, document); evaluating your solution to the problem; reporting on your work.

- Prof. Shabbir Ghadiali, *Head, Department of Training and Placement, Sarvajanik College of Engineering & Technology*

Format of IDP/UDP Report

Project Report (a spiral bound hard copy) - It is required to be a report of the work, done by the team of students during the academic semester/year. The Report is to be submitted whether the project has been completed successfully or the work is going to be carried out by next semester/year students.

Basic format and requirements:

Paper must be White Royal Executive Bond, 85 gsm Paper of A4 size only.

One side Laser Printing:	Entire Report either Black or Colour (Title & Certificate must be in Colour)
Line Spacing:	1.5
Printing Margin:	1.25 inch Left Margin 1.0 inch all Side Margin (Top + Bottom + Right)
Font:	Times New Roman only
Font size:	(Text should start from next line after Title)
Main Title:	18 BOLD UNDERLINE (Alignment: Left) (Title Case)
Sub Title:	14 BOLD UNDERLINE (Alignment: Left) (Title Case)
Matter:	12 Normal (Alignment: Justify) (Title Case)

- Figures must be with outside border & in centre of whole margin.
  All details in the Figures must be clearly readable.
- Write figure number at the bottom of figure, E.g." Fig. 5(a)", followed by title of figure in title case.
- Throughout text figure must be cited as "Fig.5 (a)".
- Write table number at the top of table, E.g. "Table 1" : followed by title of table in title case
- All paragraphs must start without 'tab'.
- Unified line spacing between paragraphs.
- Start new chapter from new page.
- No blank area at the end of each page except last page of chapter.
- All equations in the middle of line with equation no. at the end of line within small brackets, E.g.(2).
- No dots between equation and equation no. space before and after equation sign.
- Chapter heading must be identical for each new chapter as shown below.

Guidelines for Final Year Project Report: The Project report should have following components:

First Page

Title of the Project, IDP/UDP project, Name and Id. No. of the Students who have worked for the project, Academic year, Name of Industry – if it is an IDP Project, Name(s) of Industry and faculty guide(s).

Next Pages

Index

Next Pages

- Acknowledgements
- Certificates from college (Suggested Format)
- If you have done an IDP, and if the industry finds the solution useful kindly attach certificate of proof of your claim and attach along with the report. Ask the industry to precisely mention what benefit they got from your solution implementation in the company letterhead.
- Certificate generated from project site for Completion of all activities at PMMS portal of GTU. (Only for BE)
- Certificate obtained from the Plagiarism checking software. (Only for BE)

Chapter 1

Title : Introduction

1.1 Problem Summary (What exact problem are you trying to solve?) and Introduction,
1.2 Aim and objectives of the project
1.3 Problem Specifications
1.4 Brief literature review and Prior Art Search (PAS) about the project. [It should include Web search/research publication, User feedback, Vendor/market search, Patent Search (Do not attach the whole PSAR report, mention just one page gist/summary)].
1.5 Plan of their work
1.6 Materials / Tools required.

Chapter 2

Design: Analysis, Design Methodology and Implementation Strategy.
(Only for BE)

Explain your work including Observation Matrix, Ideation canvas, and Product development canvas in the context of your project. For better understanding about these canvases, you may refer:

https://drive.google.com/file/d/0B4DgcqHvqySbMDZiN1VsQ05Edmc/view?usp=sharing or
https://drive.google.com/file/d/0B4DgcqHvqySbNVF3d3RCMFM1Szg/view?usp=sharing

(Explain every step in the above canvases with your own narration based on your understanding and inferences. Also attach the photocopy/image of your canvases in A4 equivalent size).

Chapter 3

Implementation:
Should covering actual implementation, Results, Reports, Snapshots, Testing and Verification.

Chapter 4

- Summary of the results. Advantages of your work/results/methodologies. Usefulness with respect to existing solutions. Scope of future work.
- Benchmarking your project with existing product/services or solutions. Mention the unique features of your innovation/project (IDP/UDP).

References

In the alphabetic ascending order
Citations to be provided throughout the Report.

Appendix

Apart from above listed items, project report will also include below information (as an appendix to project report), submitted/generated via project management site: *http://projects.gtu.ac.in/* . These have to be represented to external examiner as well.] (Only for BE)

- Copy of four Periodic Progress Reports (PPR) as submitted by each student, along with guide comment on it.– For both semesters.
- Patent Search & Analysis Report (PSAR) as submitted by each student, along with guide comment on it.– For semester 7 ONLY
- Design Engineering canvases: AEIOU Summary, Empathy Summary, Ideation, Product Development and its report generated in line with the existing project.– For semester 7 ONLY
- Business Model Canvas (BMC) and its report generated in line with the existing project. – For semester 8 ONLY
- Draft provisional patent filling forms generated during Patent Drafting Exercise (PDE). – For semester 8 ONLY
- Copy of paper published on the basis of this Project / Patent filed (if applicable).
  (Kindly attach any paper you have published based upon the work related to your project in any national/international conferences.)
  -– For both Semesters

NOTE:

- This is a sample format, any college may amend this format based on the need, but it has to ensure that all above listed items must to be included in project report.
- The project report copy which is to be uploaded on project site, need to include above items.
  The project reports have to be submitted to departmental HODs of student's College/ Institution in spiral bound or hard copy before the practical/Viva-Voce examination. In absence of the project guide in any unavoidable circumstances HOD/suitable authority/other faculty members can sign on the certificates. For BE: Further the complete project report needs to be uploaded in soft copy to the GTU web portal specially designed for this purpose: ***http://projects.gtu.ac.in/*** (Every team needs to ensure completion of all tasks at project portal)

NOTE:

- For BE: No student/college has to submit any hard bound project copy/CD to GTU, as GTU will receive the data from student's profile in PMMS portal. Every College may preserve project data of all students/teams in a soft copy on a CD rom for further record.
- For Diploma student/college is required to submit projects via CD to GTU.
- Students who are working on projects related to VISHWAKARMA YOJANA, have to work as per instructions from their guide to cover all project activities.

Students need to submit two copies of their project report in spiral bound as follows: 1. Student Copy 2. Guide/Department/College Copy

Format for Evaluation of Projects

(For Internal & External Examiners)

In order to justify the attempts of the B.E. Semester 7th & 8th students for their first ever attempt to implement IDP/UDP at GTU, Faculty members and external examiners are requested to refer following suggestions for evaluation of Project.

- Students are to be evaluated for their innovative ideas, however small, it can be and not for size of the project. A semi-finished project done properly with innovation may fetch more score than fully finished ordinary project works.

- Basic understanding of student for project and related methodologies for its implementations need to be analysed, using your expertise. "Learning by doing" is the mantra for the students, so please evaluate the leaning of the students rather only evaluating the final outcomes of the projects. If they followed the process properly, then the outcomes must be better. Encourage students to take risk by celebrating failure of the students in projects.

- In case of students, who have fully implemented their project in B.E. they are to be encouraged. Also discuss future scope of update/modifications to current project, which can be taken up in coming academic year by upcoming batch of students.

- If project is not fully implemented, you are requested to provide inputs for their future implementations and availability of various sources to help them.

- If students have not reached to significant level in project then please analyse the causes for the same and report to university in feedback form for the Project, with your comments.

- Students are required to show case a proto type/proof of concept of their efforts in contextual branches in possible cases depending upon the feasibility and cost.

- Both external and internal examiners are required to evaluate students for final year project examination with equal weightage.

- Industry mentor from particular project or mentors from industries related to the area of project may be invited for final project examination nominated by council of deans.

- Examiner is required to note specific innovative projects during examination and mention in feedback from which are useful to MSMEs, particular user or society in large. University will recognize such innovations and appreciate the efforts of the teams to encourage them and the coming generations.

- If the team has taken projects from any user like industries, expert faculty or similar sources verify the joint efforts of students and see whether students have interacted with them and documented the works properly throughout year.

Final Year Project Open House

Reference: *files.gtu.ac.in/circulars/16Apr/16042016.pdf*

At GTU, every degree engineering College/Institute and every polytechnic is required to organize a Final year Project Fair.

The Fair will provide to every final year student the opportunity of show-casing his/her or the team's work during the year either through the working project and/or through posters of the project-work.

Guidelines:

1. For each branch/department: A team of experts, having a good mix of Senior Professors from the same college, the neighboring colleges and experts from the industry, should be invited to judge these projects at the fair and to choose the best three from each branch/department.

2. Every branch/department should also compile a list of projects in which the proposed solution /innovation/project is being implemented or is going to be used by industry/SME/User.

3. This fair should be open to all the students and the faculty of the college and all the neighboring industries. An open invitation may also be announced through the web-site of the institution so that parents of the students, alumni and any other citizens may be able to visit the fair.

4. The fair should be announced at least a week in advance.

5. The college/institute should encourage a team of pre-final year students to work for organizing the final year project fair. Besides other things, the team should invite prominent persons from their sankul, from industry and from their area.

6. Term work marks for participation in the Fair: Participation of every final year student in the fair should be considered a necessary part of the term work. 25% of the marks of the term-work may be allocated for it. The faculty member, who is guiding the project, jointly with another faculty member, appointed by the Head of the Department for the purpose, should allocate the marks. (If a college/institute/polytechnic has already conducted such a fair during this semester, every student group may be asked to make a presentation before its class for allocation of the marks.)

The list of the best three projects of each department, selected by the committee, should be compiled and sent to GTU through mail immediately after the Fair is over by the college authority, along with the report /work done by the department/college for successfully organizing the fair.

Report to GTU:

All colleges are required to send the report via email to following E-MAIL address: ***s4@gtu.edu.in*** *and* ***cic3@gtu.edu.in*** :

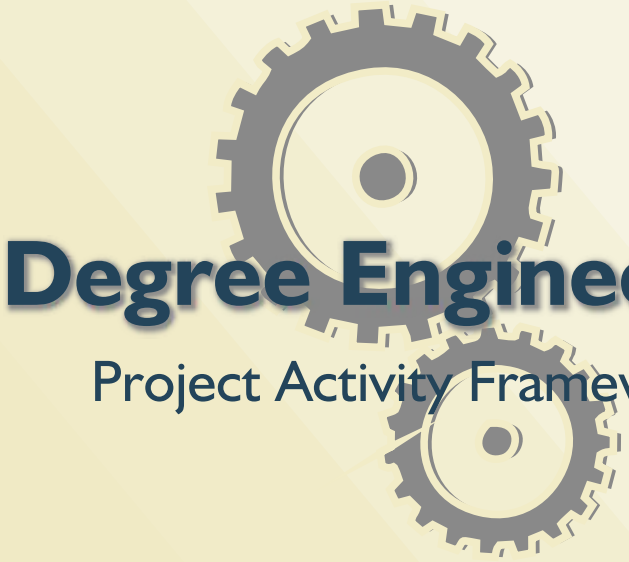
1. The list of the best three projects of each department, selected by the committee
2. The compiled list of projects in which, the proposed solution/innovation/project is being implemented or is going to be used by industry/SME/User.
3. A report of the project fair, with feedbacks from participants (students, faculty members, industry persons and others). Please mention the title of the mail as "Final Year Project Poster Exhibition @ Name of college/Institute/Polytechnic".

****Note:***

(I) A College/Institute/Polytechnic may adjust the date according to the requirements of the industry partners (a) who are working with the College/Institute/Polytechnic on the IDPs and

(ii) those, who are associated with the College/Institute/Polytechnic in its Sankul (GIDC) Committee.

(iii) If a College/ Institute/Polytechnic has already conducted such a fair during this semester, it need not do so again. But a detailed report of the activity needs to be submitted to the university at ***gic@gtu.edu.in****.*



Degree Engineering

Project Activity Framework

Action Points for Institutes and Students

Weekly schedules for various phases of project activities

Reference: *http://files.gtu.ac.in/circulars/16Jun/21062016_01.pdf*

Sr. No.	Phases	Key Activities	Time Line (in week)
1.	**Phase-I** Pre IDP/UDP Exposure program	**(a) Explaining the students about IDP/UDP lifecycle and necessary awareness** • Colleges/departments need to explain/revise entire innovation process based on Design Thinking, basic idea about IDP/UDP lifecycle, necessary steps needed and other guidelines • Arrange such exposure program for 2 days of first week of semester by department/college and explain various interventions by University toward final year IDP/UDP. • Briefing about innovation value chain and various aspects about innovation and its impact so that students can innovate through their final year project.	**01st week of semester**
2.	**Phase-2** Industrial Shodh Yatra (ISY)	**(a) Scouting for the Problem** • Selection of Domain /Industries /Area of Interest for Project • Observation/Studying the products or processes for selected domain to find out unmet needs of users • All activities via AEIOU and similar framework for the observation activity. Empathization process around particular challenges to figure out project definition. • Discussion of experience of ISY with faculty guide and other groups. • One should allocate enough time for Observation/field work to empathize user well • Prepare AEIOU, mind map and Empathy map for the insights gained from field work **(b) Secondary Research/Prior Art Search (PAS)** • Search for patents and other related literature for selected problem (PSAR) • Literature review/Web search/research publication • User feedback • Vendor Search/Market Search • Analysis of existing Technology Start-Ups (University will further share data with departments to help this)/Trend analysis **(c) Problem Definition** • Identification of problem/s related to selected domain through Diachronic and Synchronic Analysis and similar design thinking approaches. • Defining the Problem Statement from all above exercise (on the basis of Observation and Empathy of user) Empathy summarization. continue...	**02nd to 05th week of semester**

Sr. No.	Phases	Key Activities	Time Line (in week)
		• Frequent interaction with faculty guide with multiple iterations is required. • Try to define the exact challenge in the user's context/problem context/socio ecological context etc. • Look for various alternatives as solutions in different combination of material, method and application. (d) **Registration of problem statement, team etc. into online PMMS tool**	
3.	**Phase-3** Ideation and project planning(ISY)	(a) **Implementation Strategies Selection of Proper Tools/Techniques for Implementation, project planning for the IDP/UDP with clear mile stone.** (b) **Ideation Process** • Preparation of ideation Canvas (for exploring innovative idea for Problem Statement) • Ideas need to evaluate with faculty guide and industry mentor. • Ideas should be presented in drawings/sketches/mock ups (can be made from thermocol, paper, clay or any other materials to simulate and check primary concepts) • Think about solutions/ideas for different context, geography, demography, usage around the same challenge or similar. • Look for any incremental innovation either in form, feature or function related to your challenge if it can satisfy the need or check for any altogether disruptive idea to serve the purpose.	**07th to 10th week of semester**
4.	**Phase-4 MVP-1** (Minimum viable Prototype Development) Proof of Concept Stage	• Define and discuss aspects of product/process like Form, Features, Functions, Components/ Parts, Material, Manufacturing Processes etc. via Product Development Canvas • Technical knowledge acquisition to implement the project. • Actual efforts for making the proof of concept • Phase 3 and 4 will be iterative so that one can develop better proof of concept after critical insights from earlier stage and vice versa.	**11th and 13th week**
5.	**Phase-5** Potential customer validation / User feedback and implement-ation	• Define and discuss aspects of product/process like Form, Features, Functions, Components/ Parts, Material, Manufacturing Processes etc. via Product Development Canvas • Technical knowledge acquisition to implement the project. • Actual efforts for making the proof of concept • Phase 3 and 4 will be iterative so that one can develop better proof of concept after critical insights from earlier stage and vice versa.	**14th week (Completion of 7th Semester project work)**

Sr. No.	Phases	Key Activities	Time Line (in week)
6.	**Phase-6** Report making and real time PMMS updating with all Periodic Progress Report (PPR)	• All groups need to submit their final project report in the format given by University by Term end. • Real time updating in their project blog by each team and implement mentor's suggestions in real time basis throughout the semester.	**Till Term End**

7th Semester IDP/UDP examination

N.B. Those students who will finish the projects in 7th semester need to implement all the steps of 7th semester first as mentioned above for their 8th semester projects along with the 8th semester project requirements as given below.

If the teams would carry forward their 7th Semester project ahead to 8th Semester, then they need to follow the below given steps to take their project ahead and achieve the desired goal.

BE 8th Semester Project work:

Sr. No.	Phases	Key Activities	Time Line (in week)
1.	**Phase-7** Project planning for 8th Semester/implementation strategies	• Planning for the project work with timeline and milestone for entire work in 8th Semester and execute them. • Technical knowledge acquisition to implement the project. • Actual efforts in taking the proof of concept to prototype stage. • Frequent interactions with faculty guide/industry mentor/user with multiple iterations are required.	**During first two weeks of semester**
2.	**Phase-8** Business Model Canvas(BMC) & other product and market validation tool & Developing Minimum Viable Prototype **(MVP-2)**	• This step will be performed to ensure that the research or project being attempted in the final year is in right track to meet its deliverables. The feasibility, viability and similar aspects will be tested while the ongoing project will still be going on to further refine the proto-type. • Furthering the prototype after various iterations while implementing various feedback and insights obtained from BMC and other exercises. *(For research oriented projects where BMC may not be appropriate student teams can skip BMC exercise)*	**03rd to 05th week**

Sr. No.	Phases	Key Activities	Time Line (in week)
3.	**Phase-9** Patent drafting exercises (PDE) & other IP & technology management related things	• By this stage the proto-type of the final year project should be in consolidation stage. Various IP related tools and technology management processes to protect IP, improve efficiency and make it a user centric innovation will be done during this phase.	06th to 09th week of semester
4.	**Phase-10** Benchmarking your innovation and final product design	• After all the nine steps/phases as mentioned above, the teams will iterate for different steps before making the final product. While developing the product the teams will implement their technical knowhow and compare the solution with near similar existing innovations by different user or market. • Versions of prototype is essential with all details of iterations and modification *(there are more than 5000 prototypes have been made for vacuum cleaner before launching it to market, so every solution requires many iterations before final product.)*	10th to 12th week
5.	Final updates in PMMS , report making, online real time PPR submissions	• During this phase each team will check if they have updated all data through PMMS tool and finish necessary requirements • College level IDP/UDP/Project Expo and award/appreciations to best ones in presence of industry experts and mentors	13th and 14th week
6.	Working research paper/case study	• The working research paper/s could be based on actual work done by students in the project/Start-Ups related to similar technology/ technologies related to project/ trends in the subject /innovations/Patent analysis /any other analysis/Pedagogies related to their project or may be on actual Impact by the work.	Till term end

Note: • Students will be required to write small case studies/working research papers based on the insights of their research and project work in 7th and 8th Semester and present in college/conferences/seminars. *(But it would be advisable to file a patent before it, if the research and project is unique and highly novel. In other cases they can go ahead with research publication directly.)* The working research papers could be based on actual work done by students in the project/Start-Ups related to similar technology/technologies related to project/trends in the subject/innovations/Patent analysis/any other analysis/Pedagogies related to their project of 7th and/or 8th semester or may be on actual Impact by the work. • Each team pursing BE has to make working research paper/s in 8th Semester and present it to jury in the college and university nominated experts. • GTU external examiners and internal guides (industry guide can also be invited) will review the working research paper/s during final year project examinations. Internal evaluation of such work can be done as a part of continuous evaluation of the project work.
• Student teams can also present their papers in any other conferences during the academic year. If they have been accepted in high impact conferences, weightage should be given while making project evaluation by examiners for university examinations. • (A)Teams having filed genuine novel patent through GTU patent clinic or other ways, (B) students having published research papers in impacting journal/conferences/Seminars (C) Teams having built enterprises/Start-Ups based on final year project work or similar research will be given special certificates at the end of the academic year by GTU. • If any team of students feel that their project can fulfill the criteria of "Specialization in Technology Entrepreneurship " program in GTU while doing their final year project or project through Design Engineering program then they can apply separately for the said program before commencement of 7th Semester.

Four-Step Process for Defining a Final Year Problem Statement

Reference: *http://files.gtu.ac.in/circulars/16JUL/14072016.pdf*

STEP 1: Scouting for the problem
(Within the period of summer vacation (one month), before start of semester seven)
STEP 2: Secondary Research/ Prior Art Search *(During first month of semester seven)*
STEP 3: Problem Definition *(During first month of semester seven)*
STEP 4: Registering onto PMMS portal by GTU *(Within six weeks of semester seven)*

STEP 1: Scouting for the problem - The problem may be found by studying the products or processes of an industry through an **Industrial Shodh Yatra (ISY)**. A project based on such a problem is called an Industry Defined Project (IDP). *(As per details mentioned under **Point 1 and Point 3** in following pages)*

Student teams will be using **AEIOU framework** for the observation activity.
*(As per details mentioned under **Point 4** in following pages)*

AEIOU stands for Activity, Environment, Interactions, Objects and Users. Hence every team needs to observe for these basic elements in their selected domain. This framework will help to decide unarticulated needs of users. Students need to go through the process of Observation, Immersion *(role playing)* and engagement *(interview)* to get their requirements for the projects.

STEP 2: Secondary Research/ Prior Art Search - Students team need to search for patents and other related literature for their selected problem statement to check the already existing ways to solve similar problem and to find out about existing similar innovations. The team needs to upload Patent Search & Analysis Report (PSAR) on the Project Mentoring and Monitoring System (PMMS) in due course. Please see the detailed description in this document about steps for secondary research/PAS. *(As per details mentioned under **PSAR activity** in earlier pages of guideline, and **Point 2** in following pages)*

STEP 3: Problem Definition - Final scouting through Diachronic and Synchronic analysis: After primary observations, the team of students shall perform Diachronic and Synchronic Analysis of the product/system/process being examined. *(As per details mentioned under **Point 5** in following pages)*

Every team of students needs to discuss their visit of Industries with the faculty guide and with other groups by using the diachronic and synchronic analysis methodology and by preparing images/charts/ diagrams for explaining flow of ideas clearly. The problem statement, to be defined, shall be based on the user study and needs, role play, observation, empathy, primary prior art search and understanding of the macro system, etc.

By the process of observation, immersion and engagement *(As per details mentioned under **Point 4** in following pages)* students would be able to understand the problem of industries/users whether the problem/possible innovation is in form, feature or function and/or material, method or application. After the observation, the perception of the team of students for the problems may change or even differ from the previous one. And from those inferences students need to define their final problem statement after iterative analysis again and again. Each team needs to frame a precise problem definition, after understanding all the necessary aspects of the problem.

Group discussion/presentation with faculty guide and other teams and stakeholders: After the industry visit, prior art search, diachronic & synchronic analysis and other design thinking practices, each team needs to discuss their activities and about their scouted challenges from industry with the faculty guide and other groups in the class. On the basis of further discussion and inputs, the team needs to define the exact problem statement for which they will be working during Final Year Project/IDP/UDP. Problem identification by the group members is overlapped by the problem identification by the user/s and the problem identification by the various stakeholder/s other than them. On the basis of all these inputs the final and precise problem statement is generated.

STEP 4: Registering onto PMMS PMMS *(Project Mentoring and Monitoring System)* portal by GTU:- Within first six weeks of semester seven, every team must register themselves through online portal called PMMS by giving the title of the project, the names of the team members and name of the Faculty Guide. For an IDP, the name of the industry and the Industry-Mentor for an IDP must also be specified. GTU has created this IT tool so that the mentors can work along with the faculty guides and students to help make the project better. This platform will also track progress and challenges in every 15 days and will keep the faculty guide, students, and the external mentors connected.

Point 1: Notes on Scouting for the Problem

STEP 1.1 Scouting for the Problem: METHODOLOGY OF DESIGN DRIVEN INNOVATION (DDI)

An engineer is a problem solver and as such he/she has to inculcate the process of thinking as a designer to develop new products or processes. Every team of students should use the methodology of Design Driven Innovation for their project. This Design Driven Innovation process is based on Design Thinking Approach.

"Design Thinking is a human-centered approach to innovation that draws from the designer's toolkit to integrate the needs of people, the possibilities of technology, and the requirements for business success."

—Tim Brown, President and CEO of IDEO

Design Thinking can be applied to solve all kind of problems from the simplest to complex problems. Design Thinking is a mind-set that is possibility driven, Option focused and iterative. This can be divided into six interactive as well as iterative steps shown below. Each steps of design thinking involve rigorous and interactive efforts from defining a particular problem to deploy the solution in the market. Every step would involve iteration to check the idea/solution with the previous one to move forward.

Design Thinking - Human Centric Approach

STEP 1.2 Immerse: Role Playing

In this activity a student need to become the user and actually live their experiences. During this process the innovator needs to envisage him/her as the user of the desired product and identify, codify various needs from his/her perspective. During the immersion process, students and their Guide can get insights about the non-codified and undocumented needs of the contemporary user/industry.

Being the user and primary problem identification:

The group shall be divided into two: Few members will be 'role-playing the users' and identifying the problems by first-hand experience and the rest of the group members will be video-graphing the interviews *(primary users, secondary users, stake- holders, etc.)* The group members that would be role-playing are encouraged to perform the function of users in the industry they had visited. For example, for problem identification in a steering wheel of a car, the group must learn how to drive a car and understand how the steering wheel is being used and in how many different ways it can be used. The members that would be video-graphing are to record the videos at high FPS *(frame per second)* to enable them to view the videos in slow motion at a later stage for reference and better understanding.

The other group members will interview the entire bandwidth of stakeholders. For example, while identifying the problems pertaining to the steering wheel, the stake holders would include the car manufacturer, distributers, mechanic, driver, owner, various vendors *(leather, nylon, adhesives, etc)*, various people on the shop floor or assembly line that assemble the part into the car, etc. A visit to 3-5 places would help the group identify the problem process or area along with identifying the minor deviations that are there in each factory to suit their individual needs. This also helps the group to understand how any process can be customized to suit needs and increasing either comfort of operation or final output. This also introduces the group to frugal innovations and its practices, that India masters.

Another technique of understanding the needs and persona of the user and the stakeholder is noting the 'personal inventory' of them. It is a method of understanding the user and stakeholders by recording what other products/items they use. For example, if the user's inventory records are a pair of RayBan shades, a DSLR camera, a tripod, a pair of extra macro lens, a leather wallet, power bank, brass keychain, a deodorant, an aftershave lotion, etc.

The inference can be drawn that the user is a person that is extremely organized, uses branded products, is passionate about photography, likes to drive, etc. It also gives a hint of the purchasing power of the user and stakeholders and helps in product placement and bench marking of the products (Image: Personal Inventory of an Artist
http://36.media.tumblr.com/04f88f01e46d2b0e06f5c1eef85808bb/tumblr_mpbwrzhlvK1qz9v0to2_1280.jpg).

STEP 1.3 Engage user by Interview technique

Interact and interview users through both scheduled and short "intercept" encounters. Prepare the set of questions to be asked to the same industry workers/executives/stake holders for thorough research. Some guidance is given in the link which describes different methods for interviewing and observation from Stanford University ***(http://dschool.stanford.edu/wp-content/uploads/2013/10/METHODCARDS-v3-slim.pdf)*** on how to formulate questions to get the most relevant answers and how to verify/validate the same. Interviews are to be video-graphed, hence necessary equipment to be carried along with the study as and when required.

Getting out of the building and actually talking to your users is probably uncomfortable but potentially most effective way, if it is done in the right way. The thing here is not to directly go up and ask your user for the solution because most of the time they really don't know about the solution and even about the problem. Engage them in conversations that allow users to tell stories of their experiences and a likely solution.

Point 2: Notes on Secondary Research/Prior Art Search

STEP 2: Secondary Research/Prior Art Search: *(For increasing the innovation quotient of your IDP/UDP)*

PAS: Prior Art Search activity: what it includes:

1. Web search/research publication
2. User feedback
3. Patent search (PSAR)
4. Vendor/market search

During this Patent Search and Analysis Report (PSAR) generation activity, every student within a team has to study at least 5 patents related either to his/her IDP/UDP or related to his/her area of interest. Analysed data of each of these five patents is to be submitted online at: ***http://projects.gtu.ac.in/***, along with the project progress details, once the university declares the due date for the same. The team needs to compile the findings of each member during PSAR and make a report on:

1. What are the other solutions already existing and what are specific patent claims solving particular need or adding value related to your project?
2. How does the team wish to improve existing patent claims by their own project?
3. What would be new value addition/distinct feature the team will add to ensure their solution becomes unique and novel?
4. Which innovator/industry has already started working on improvements, the like of which you have taken up as your Final Year project? This will let the team understand the orientation of future research in academia. The academic R&D can be streamlined by tapping such data where industry aspires to build product/process which is going to come to market in future.

Prior Art/ Literature search is the step after gathering primary data from the domain/field and to begin any project. Many of the students have been developing novel solutions, but quite often they are not aware about the Intellectual Property Rights (IPR). Some of their solutions are quite unique and might fulfill the criteria of patentability. Student teams need to search related literature for selected problem product/process/system through patent database, literature review, market search/user interaction. Every team can search the relevant literature using various search databases *(for web and patent search)* by entering the key words with combinations of Boolean characters and/or wild characters. As patents are one of the most important aspects of Prior Art Search, some of the online free databases are listed below for reference:

Search Databases	Web Link	Scope of search
Google's Patent Search	http://www.google.com/patents	US patents only
USPTO	http://patft.uspto.gov/	US Patents only
EPO	https://worldwide.espacenet.com/?locale=en_EP	• EP Patents • WIPO patents • Worldwide patens
Patent Scope (WIPO)	http://www.wipo.int/pctdb/en/	WIPO Patents
Indian Patent Office	http://ipindiaservices.gov.in/publicsearch/	Indian Patents *(Granted as well as 18 month Published Patents)*

PAS helps one to understand what has been done/attempted before. This enables innovators obtain ideas on which he/she should work further.

Point 3: Industrial Shodh Yatra

Final year project: Final Year projects are the capstone of engineering education. After going through technical subjects during their studies, the young brains have the necessary background and have learnt how to acquire technical knowledge for solving real life challenges. The work on the Final Year project helps a student integrate the knowledge, from various courses that he/she has studied, for solving a problem.

GTU wants the projects to be socially relevant and/or to be able to meet industry's requirements.

The users of an engineering product or process may be MSMEs, Large Scale Industries, Informal Sectors, Expert Individuals or Institutions, NGOs etc. GTU requires that each team of students should interact with the user of their choice and map the unarticulated needs of respective users. The need may be for improving a product or a process or it may be required to develop a new product for satisfying the need. The team of students will develop the improved or a new product/process as their Final Year project, with the approval of the Faculty-Guide.

Industrial Shodh Yatra: Industrial Shodh Yatra (ISY) is the course of action that leads a team of students towards a creative interaction with diverse users to discover a challenge/ problem, the solution of which would lead to a better product or a more efficient process for a particular user or for a group of users or an industry. The suggested innovations may be incremental or disruptive.

In this process of ISY the team members are required to follow design thinking approach and define a problem statement through the process of observation, immersion and engagement. During an ISY, a team of students, accompanied by their faculty guides, are required to interact with one *(or more)* industry/user and adopt a systematic approach to document the opportunity of improvement or of finding a new solution.

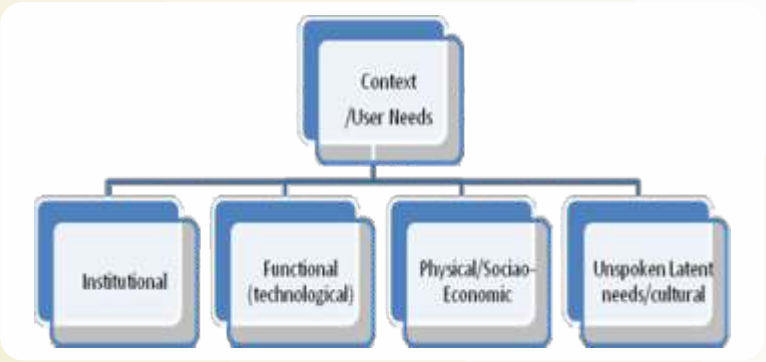
Generally an Industrial Shodh Yatra is organized by a College/Institution or by a Head of Department (HOD)/by a Faculty Member. A team of students visit an industry and spend some time to study the products and processes of the particular industry and to have technical discussions with the personnel at the industry. The visit may conclude in discovery of an appropriate problem for the Final Year project for the team of students. The concepts of IDP/UDP and ISY were defined by GTU in 2010-2011.

Objectives of Industrial Shodh Yatra (ISY):

1. Forging linkages between Industry-Academia
2. Mapping real -life need of users/MSMEs/Industry/Others/Innovators
3. Codifying scouted challenges with the help of industry
4. Scouting innovations done by MSMEs and benchmark them with respect to global solutions
5. Mapping the Gap & converting it into final year projects as a part of Academic Research
6. MSMEs can leverage final year students as a skilled technical Human Resource for technology development, while students will get learning opportunity. This is particularly helpful to MSMEs since they may not be able to afford their own full-fledged R&D facility.
7. Using design thinking approach for developing incremental innovations for existing products or processes by doing innovations in form/feature/function and/or material/method/application of product. This process is called Design Driven Innovation (DDI).

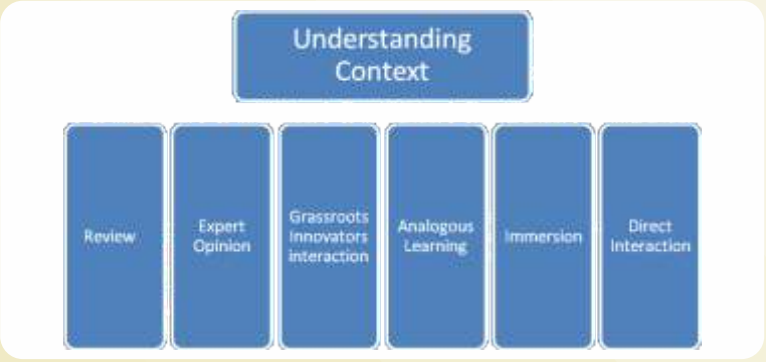
Whether a student chooses to take up an IDP or an UDP, the Final Year project should use the approach of Design Driven Innovation. This will make the work on the Final Year project interesting and educative, leading to the graduation of an engineer, who may be able to face the challenges of designing new products or processes successfully.

Steps in Industrial Shodh Yatra (ISY):



ISY involves two of the six steps *(given in the figure on design thinking)*: "OBSERVATION" and "EMPATHY" only. The team of student should go through the steps of "OBSERVATION" and "EMPATHY" by a systematic process, even though an external user like a specific industry may not be available in case of UDP. Student needs to define the exact parameters, context and the situation that will lead to the solutions pertaining to a particular problem. For this we need to define the user needs.

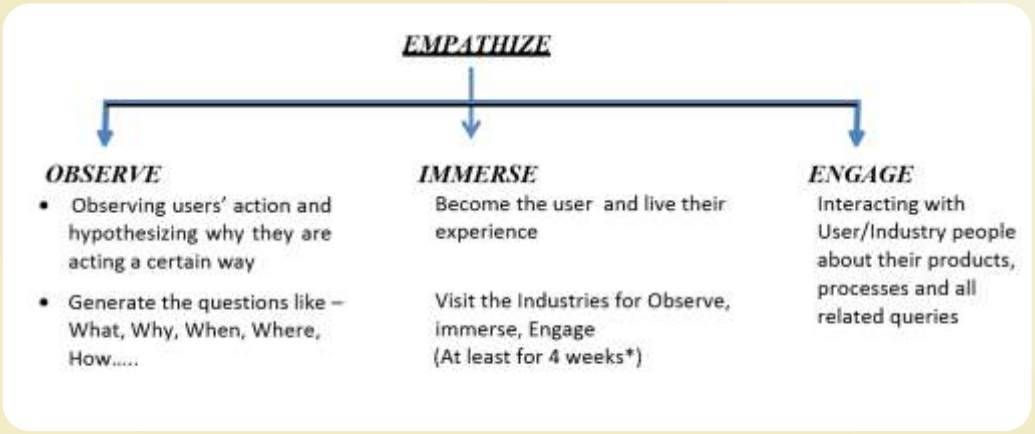
First students have to define all the parameters and then they need to take some specific cases to understand these. The latent needs can be better understood only when we interact with the user. This includes observation as well as detailed discussions with the community of users.



The user needs and context can be understood through the following parameters defined in terms of the needs and context: functional aspects, physical aspects, latent needs and institutional aspects.

Empathize:

To Empathize the User, one needs to observe again and again. For better Empathy of User, students need to follow the following steps of Observe, Immerse and Engage.



Point 4: AEIOU Framework for Observation Activity

STEP 1.1 Observation: With the help of AEIOU framework

Student teams will carry out the observation activity for their selected domain/industry with the help of AEIOU Framework. AEIOU is an investigative tool to help a designer to interpret observations gathered by ethnographic practices* in the field. It is an Observation tool. "Its two primary functions are to code/gather data, and to develop building blocks of models by analysis of data that will ultimately address the objectives and issues of a client/user." The groups of students are requested to divide the work amongst each other for AEIOU framework.

For format of the AEIOU canvas, please refer canvases as mentioned under Design Engineering - Canvas Activity.

References:

- Regarding AEIOU theory, please refer to:
  http://gtu.ac.in/circulars/15Apr/04042015_AEIOU.pdf
- The AEIOU framework was originated in 1991 at Doblin by Rick Robinson, Ilya Prokopoff, John Cain, and Julie Pokorny. Its aim was to help analyze Ethnomethodology data andd Conversation analysis with MECE categories. You may refer it from the following websites:
  http://www.drawingideasbook.com/images/AEIOU_worksheets.pdf
  http://www.doctordisruption.com/design/design-methods-8-aeiou/
- Ethnohub: ***http://help.ethnohub.com/guide/aeiou-framework***, accessed on 16 May 2015
- ***http://en.wikipedia.org/wiki/Ethnography***

Observation Technique:

1. What is user/person (or users/persons) doing?
   -What is the user/person you're observing doing in a particular situation?
   Note the obvious as well as the surprising and random activities. Just report the objective facts.
2. How are they doing it? (Body Language, posture, style etc.)
   -How is he doing it? Does it require effort? Does he appear rushed? Pained? Happy? Sad?
   Is the activity impacting the user in either a positive or a negative way?
3. Why are they doing it in this way?
   -Why is he doing what he's doing, in the way he's doing it? This step usually requires that you make informed guesses regarding motivation and emotions. This step will reveal assumptions that you should ask users about, and it will often uncover unexpected realizations.

General Information:

- Information/Data are gathered via ethnographic methods: notes, photos, videos, interviews, field observation, etc.
- During field observation, use the AEIOU framework as a lens to observe the surrounding environment.
- Record observations under the appropriate headings.
- Supplement direct observations with photos or video tape when appropriate.
- Review and cluster observations to disseminate higher-level themes and patterns.
- A,E,I,O,U individual analysis can be done in A3 paper but the whole AEIOU summary canvas to be A1 size canvas.

Point 5: Diachronic & Synchronic Analysis

STEP 3.1 Diachronic and Synchronic Analysis:

Diachronic analysis means the analysis of how a particular activity has been performed since thousands/hundreds of years ago. This is better studied by plotting it along a timeline. For example: How forging was done in renaissance era to how it changed during the industrial revolution, how it is done in modern times and how it is being done with the help of robotic arms. Identify the changes in process and tools and why those changes were adopted. Refer the images of Diachronic Analysis for Mobile phone/Communication Device in the given link:
http://ig.computersciencedegreehub.com/evolution.jpg and
http://www.designinfographics.com/infographics-images/evolution-of-the-cell-phone-the-worlds-gone-crazy.png

Synchronic analysis means the analysis of how a particular activity is being performed in various other parallel industries. Activities similar in action like forging. Refer the images of Synchronic Analysis for Mobile phone/Communication Device in the given link:
https://drive.google.com/open?id=0B4o8FlssBX7BNTFGUDBWVmdzQ00&authuser=0

In general, diachronic analysis relates to the way something changes (or doesn't) over time and why. Synchronic relates to the way something is used at a certain point in time but in different contexts (Students must observe the constants and the variables). The groups stay in the college/institute and generate their prior art search data and primary diachronic and synchronic analysis.

GTU believes that by thoroughly crafted policies, processes, incentives and real-time mentoring and quality benchmarks, at least 1000 student projects can become useful products every year. Some of these innovations can possibly become successful technology Start-Ups or get transferred to MSMEs who in turn can use them for improving their productivity and create value.

Note:

- No student/college has to submit any hard bound project copy/CD to GTU, as GTU will receive the data from student's profile in PMMS portal. Every College may preserve project data of all students/teams in a soft copy on a CD rom for further record.

- Students need to submit two copies of their project report in spiral bound as follows: Student Copy and Guide/Department/College Copy

Project Mentoring and Monitoring System (PMMS)

Reference: *http://files.gtu.ac.in/circulars/16JUL/14072016.pdf*
Website: *http://projects.gtu.ac.in/*

GTU IT team has developed a Project Mentoring and Monitoring System (PMMS) portal to managing various activities related to final year B.E. Projects. PMMS is very user friendly and result oriented platform which helps students, faculty, external guide, mentor, colleges for managing multiple activities being carried out during working on final year project of B.E. PMMS is in operation since January 2015.

PMMS is a platform which covers multiple activities, which are being carried during final year of B.E. It covers activities such as:

- Student registration,
- Team formation,
- Periodic Progress Report (PPR),
- Patent Search & Analysis Report (PSAR) generation activity,
- Design Engineering – Canvas activity,
- Business Model Canvas and its report upload,
- Patent Drafting Exercise (PDE),
- Final project report upload,
- Uploading the plagiarism search report,
- Completion Certificate generation.

Various functionalities have been generated on PMMS platform for catering the need of students, faculty, project guide, external mentor, HOD and Principal. And GTU IT team is continually working to add further more features to make system more user friendly and result oriented.

PMMS is been used for all projects being carried out by the students, faculty, external guide, mentor and colleges in all the BE colleges/institutes, affiliated with GTU.

Objective of the PMMS

- To develop a system for helping the students to get appropriate help and mentoring
- To help them work more systematically on their project.
- To help students to remain in active contact with their team members, their faculty
- Guide and industry-mentors (if any), HOD, principal as well as by university - on a real time basis.
- The students in the team can update about their progress in project and guide can comment on their status, progress and problems.
- This will increase collaboration and co-creation while improving novelty of their work.

Various activities on PMMS portal

- **Students Registration and Team Formation**
  BE semester 7 students have to register themselves at: ***http://projects.gtu.ac.in/*** with their details, once students registers themselves at above portal then their approval to PMMS system is to be made either by their HOD or Principal from their PMMS account. Once HOD/Principal approves the said students, the password to log in to PMMS portal for students will be sent on their given mail Ids at registration form.

After log in to PMMS, students have to form their team based on their project details and project partner's enrolment numbers. Such team is formed by any one of team members. Student can form their team by giving appropriate details of their project and project guide. Then student have to add team member by giving their enrolment numbers.

- **Periodic Progress Report (PPR) Activity:**
  In Periodic Progress Report (PPR) task, each individual student has to give update with respect to his contribution in progress of project at regular time interval of fourteen days, by answering following questions:
  - What progress student has made in the project related to their final year IDP/UDP?
  - What Challenges student has faced and how they are trying to solve them?
  - What support student needs?
  - Which literature student has referred and its analysis?

- **Design Engineering - Canvas Activity**
  During semester 7 the student teams are required to carry out following design engineering canvas activities related to student's project to identify and filter out good ideas and project definition to work upon:
  1. AEIOU Summary & Mind mapping
  2. Empathy Canvas
  3. Ideation Canvas
  4. Product Development Canvas

- **Patent Search and Analysis Report (PSAR) Generation**
  The Objective of PSAR activity is to increase awareness regarding patents among students and faculty by making them familiarity with patent websites & patent documents. During this Patent Search and Analysis Report (PSAR) generation activity, every student within a team has to study at least five (5) patents related either to his/her IDP/UDP or related to his/her area of interest. Analysed data of each of these five patents is to be submitted online at PMMS portal.

- **Business Model Canvas (BMC) Exercise**
  Business model canvas is used to validate the market significance of products and services which will be of technology nature in this case. Technology projects are often solutions or processes that solve a technical problem. However the market implementation of such solutions also require that the problem solution is designed to overcome not just the technical barriers but also market and business related barriers of costs, customer reach and collaborations and those that pertain to the practical nature of limited initial capacities within the team.

  Thus business model canvas can be used to visualise such market problems and customer expectations. This exercise will increase the market potential and penetration of technology goods and services. This will make them more effective in market. All student teams have to develop and prepare a BMC with respect to their project if applicable. They also need to upload the prepared report on BMC at project site: http://projects.gtu.ac.in/

- **Patent Drafting Exercise (PDE)**
  As a part of BE semester 8 students project work, GTU has introduced "Patent Drafting Exercise (PDE)" in 2013-14. This activity is designed to train our students about provisional patent filing procedure in India, its requirements, necessary forms, fees, associated time limit etc.

This is in continuation of the "Patent Search & Analysis Report (PSAR)", which was prepared by all students during semester 7 of BE as a part of Prior Art Search (PAS) activity. PSAR was introduced to make students aware about patents, patent information websites, patent search, patent documents etc. in the area of their final year project so that they can improve the novelty of the final year projects by knowing what has been done before.

- **Plagiarism Search Report**
  All the student teams have to check their project report for plagiarism, which indicates percentage similarity of the languages used during drafting project report, using a good plagiarism-checking/search software package. All student teams have to get plagiarism search certificate using online plagiarism checker. The student has to check his/her dissertation thesis for plagiarism, which indicates % similarity of the languages used during drafting, using plagiarism checker platform.

  Scanned PDF copy of that plagiarism report is required to be uploaded on PMMS portal by each team doing final year project/IDP/UDP with verification signature of concerned internal project guide.

- **Final Project Report**
  Project Report - It is required to be a report of the work, done by the team of students during the academic semester/year. The Report is to be submitted whether the project has been completed successfully or the work is going to be carried out by next semester/year students. The format and preform for content to be included in final project report are mentioned in detail in PMMS guideline: *http://files.gtu.ac.in/circulars/16JUL/14072016.pdf on page 42 to 46*.

- **Completion Certificate on PMMS**
  A Special functionality is developed on PMMS portal, to generate completion certificate mentioning the status of various activities performed by each student of every team. This certificate is to be generated by each group member individually. This certificate will mention about weather each student has completed all tasks or not, whether any activity is still pending etc. All students are required to generate this certificate via project site, and are required to attach the same with their project report along with their respective guide's signature.

- **External Mentor Management**
  To invite and engage the external mentors: experts of specific domains (industry owners, subject experts, R&D professionals, and external faculty), in to student's projects, GTU has launched a Mentor Management functionality under PMMS portal. GTU invites external mentors to get engage with student's project, from any state or any country, without any limitation of geographic boundaries. Mentors must not be a GTU Faculty. Any interested person can register as Mentor for final year B.E. projects via receiving an invitation by GTU Faculty/HOD/Principal/University PMMS team from their respective PMMS account, or professional himself/herself can apply to register as Mentor on PMMS portal via following link:
  http://projects.gtu.ac.in/layouts/15/GTUPMMSMentor/ReqForMentorRegistration.aspx

IDP/UDP Credit Summary for Final Year Degree Engineering Projects

Note: In cases of any conflict or confusion user is advised to refer Syllabus for Degree Engineering available on GTU website at: *http://old.gtu.ac.in/syllabus.asp*
Credit system for 8th semester will be uploaded soon on GTU website.

Sr. No.	Branch	8th Semester Credits
1	Aeronautical Engineering	4
2	Automobile Engineering	4
3	Bio-Medical Engineering	8
4	Bio-Technology	6
5	Chemical Engineering	4
6	Civil Engineering	6
7	Computer Engineering	5
8	Electrical & Electronics Engineering	8
9	Electrical Engineering	8
10	Electronics Engineering	4
11	Electronics & Communication Engineering	4
12	Electronics & Telecommunication	4
13	Environment Engineering	5
14	Food Processing & Technology	4
15	Industrial Engineering	5
16	Information Technology	4
17	Instrumentation & Control Engineering	4
18	Mechanical Engineering	4
19	Mechatronics Engineering	4
20	Metallurgy Engineering	4
21	Mining Engineering	4
22	Plastic Technology	4
23	Power Electronics	4
24	Production Engineering	4
25	Rubber Technology	4
26	Textile Processing	4
27	Textile Technology	4
28	Computer Science & Engineering	5
29	Information & Communication Technology	5
30	Manufacturing Engineering	4
31	Environmental Science and Technology	6
32	Chemical Technology	4
33	Environmental Science & Engineering	4
34	Nano Technology	8

Appraisal Form For IDP/UDP

To be filled Up by the Internal Examiner/Project Guide of the IDP/UDP

(Submit Duly Filled & Signed form in sealed cover along with the External examiner's feedback form)

Name of the Internal Examiner:
Type of Project: ❑ IDP ❑ UDP
Title of Project:
Group or Identity No. of Students:
Marking: A= strongly in favour, B = moderately in favour, C = Not Much, D = Not at al

As an IDP Group (Tick the suitable option)	A	B	C	D
1 All Students of group understood and agreed on how the whole project was broken down into sub-tasks.				
2 Work was distributed according to the skills and knowledge and capacity of each student.				
3 All Students were clear about the time frame and their own responsibilities.				
4 All students involved understood that their work would contribute to the group's success.				
5 Individual difficulties experienced by individuals were discussed in the group and other students helped to resolve the difficulties.				

The Task Execution	A	B	C	D
6 The work was perfectly & clearly distributed among all students.				
7 The timing and sequencing of sub-tasks done to progress stage by stage.				
8 Survey and Data collected were organized systematically for later use.				
9 On-going checking throughout the process was made to ensure that everything was on the right track.				
10 Appropriate corrective measures were taken to handle unexpected problems.				
11 The quality of work produced was assessed regularly during the process and also at the end.				
12 Systematic Survey and Literature study done.				

The student's Roll in the IDP/UDP Group	A	B	C	D
13 To accomplish the part I taken and in time.				
14 To complete IDP and produce good quality Solution.				
15 Coordination among the group of students was very cohesive and strong				
16 This IDP is a Real life Problem.				
17 It seems that the concepts learnt from available previous concepts and the inspired from other				

The Name & Signature of
Internal Examiner/Project Guide of student's group

External Examiner's Suggestions regarding the Project/IDP/UDP during B.E. 7th semester

Academic Year: _____

(Tick mark the below option/s, wherever you agree with the proposition.
In each of the following, you may mark more than one option also.)

1. **What is your comment on the originality of the project/IDP/UDP?**
   a. It is largely original and concrete efforts have been made by the students but further efforts are required for its practical implementation in real life.
   b. Project solution is partially adopted/copied/or taken from third party.
   c. Project is a repeat of common knowledge but relevant to local need and can help the user.

2. **What is your comment on the project/IDP/UDP definition and synopsis?**
   a. The project is very novel and relevant and it can help the end-user if it is solved as desired.
   b. The project is not novel but it is based on genuine needs of industry or user.
   c. The project solves a real life challenge (top 5 % of the class) and the solution can be readily implementable, if it is completed. *(In view of the fact that the project solves a real life challenge, the issue of it being novel or not is irrelevant.)*
   d. The project is ordinary and it may not benefit the industry or end user, even in local context.

3. **What are the efforts made to increase the novelty of project/IDP/UDP such as Patent Search Analysis Report (PSAR) and other literature survey?**
   a. Team has thoroughly studied patents and worked out an excellent Patent Search Analysis Report (PSAR) and literature review, related to their IDP/UDP to increase novelty.
   b. Team found that their project is not novel after preparing Patent Search Analysis Report (PSAR) and literature review. Hence the team significantly modified the definition and the course of action of the project during 7th semester.
   c. The team did ordinary efforts for Patent Search Analysis Report (PSAR) and literature review, and hence compromised with the innovativeness of the project.
   d. The team has not done Patent Search Analysis Report (PSAR) and literature review activity.
   e. The project is highly innovative and from the PSAR, it seems that it may lead to patent filing of the original work of the current project.

4. **How did you find the co-creation between the internal guide, the industry mentor *(if connected with the project)* and the project/IDP/UDP team?**
   a. The team and the guide were continuously interacting and tried to complete the desired portion of the project during 7th semester.
   b. The external industry mentor played a critical role in providing support and mentoring of the project during 7th semester.
   c. The external mentor did not play any role in the project mentoring during 7th semester.
   d. In case of help required, the team was also in touch with other faculty members from the same or other colleges.

5. How did you find the team's performance during project presentation / report / viva?
   a. Team worked very well and you believe such teams are rare in this batch.
   b. The project definition and synopsis is good but the team could have done better than the present status to solve it in the allotted time and resources.
   c. Team did not work as required and failed to deliver the desired goals.

6. If you feel the project is having innovation potential and can be taken to either product stage or can be developed further, which of the following resource/s will you recommendable? *(Please tick mark the out of the following option/s).*
   a. Financial support for developing it.
   b. Proper mentoring from industry and/or academia.
   c. IPR or patenting/copy right support.
   d. Taking the project further in relay model through the same or other students during the next academic semester/year.
   e. Integrating it with similar or complementary innovation/projects.

Signature of External Examiner

Further comments/suggestions, if any:

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Please submit the duly filled and signed form in a sealed cover (not along with the mark sheets).

DEGREE ENGINEERING

Internal Examiner's Feedback Form: Project–II for BE 8th Semester

(Submit Duly Filled & Signed form in sealed cover along with the external examiner's feedback)

Academic Year: _____

1. Name of Internal Examiner :
2. No. of Students in a Project Team:
3. Project Title:
4. Project ID: Project Type: ❑ IDP/ ❑ UDP (Tick suitable type)
5. Group No. (if any):
6. Status of Current Project: Fully Completed / Partially Completed

Table – I (Tick the suitable option)

		Poor	Average	Good	V. Good	Excellent
1.	Basic Analysis of the project					
2.	Level of Literature survey					
3.	Understanding of Actual Implementation					
4.	Indignity of the Project & its application					
5.	Understanding of the Future Modifications, if any by the students.					
6.	Skill level of the students for actual implementation					

Internal Examiners' comment/suggestion regarding the project: Tick mark the below option/options:

1) **How did you select your students for the final year project?**
   a. Students formed their own group and chose their guides
   b. Students formed their own group and guides were assigned by institution/dept.
   c. Institution facilitated process where students were grouped based on their interest/talent and your expertise and guides were assigned
   d. Institution facilitated process where students were grouped based on their interest/talent and your expertise and guides were chosen by students
2) **How often the students consulted you while defining the IDP/UDP and while solving it?**
   a. Every week b. Monthly c. Very Rarely d. You kept tracking their work of your own
3) **How engaged were the industrial participants (if any) in helping your student while defining and developing the IDP?**
   a. Very Engaged: Got help & mentoring involuntarily as well as when ever asked
   b. Good: Got help only when students approached
   c. Low level cooperation: Got help/mentoring after repetitive requests
   d. Low to No Cooperation: No cooperation post IDP definition
   e. No Cooperation: No cooperation pre or post IDP definition
4) **Assess the quality of team work on the project?**
   a. High quality and exceptional team work, everyone learnt something new, output was excellent
   b. Very good team work and output was very good
   c. Only a few team members worked but the output was acceptable
   d. Only a few team members worked and the output was unacceptable
   e. The team work was missing and the team failed to deliver

5) **Did they utilize the framework given by GTU Innovation Council and made efforts thoroughly?**
   a. Students worked only towards the end of the project submission
   b. Team was serious on defining the IDP, making prototype and finally solving it.
   c. Students did it as ordinary project as used to be done since years
   d. Team even put together their own financial /other resources to solve the IDP/Project
6) **Tick all applicable:**
   a. Students worked seriously on their projects during IDP definition phase
   b. Students worked seriously during the solution design phase
   c. Students worked seriously during their submission stage
   d. Not during any of the stage
   e. Team only copied/picked up the project from past years
7) **Was the time allocated for students for their innovation/project work sufficient?**
   a. Time allocated per week is less than required
   b. Time allocated per week is more than required
   c. Time allocated is perfect but better coordination is required in 7th and 8th Semester such as through a uniform academic credit/hours scheme for all branches
8) **Which parameter/s you noticed while the students were doing their projects in the final year.**
   a. IDPs were challenging and current academic system does not train the students in cutting edge skills and needs.
   b. Students are well capable of solving challenges but handholding throughout the process and monitoring can ensure better efficiency.
   c. Students are not having idea on IPR/Design/Startups etc so they end up with projects just to satisfy academic requirement.
9) **Tick if the following apply about IDP/UDP Teams:**
   a. Mix Skills/Departmental teams of students produce better IDP/UDP results
   b. Those teams did better work who were having continuous mentoring from industry persons
   c. In terms of innovation potential, UDPs and IDPs can be equally attractive
10) **To improve UDP/IDP outcomes:**
   a. Faculty guides need to be incentivized through non- monetary measures *(awards/appreciations/acknowledgement/as CV point for promotion etc).*
   b. College lab infra and quality of faculty guide is critical to the novelty of the IDP/UDP.
   c. Pre final year students should be given minor projects like regular assignments so that they can start working and also in some cases even they can be allowed to work with final year students voluntarily. to prepare them for IDPs/UDPs
   d. Project Examination process must be improved
   e. Kho-Kho (relay) model can be adopted. Unfinished projects of I batch need to be allowed and reassigned to next batch students as final year project to take it from the point where it is left by earlier batch to complete it in few cycles.
   f. University should support good projects/innovations for IPR/Patenting, designing prototypes, commercialization

Signature of Internal Examiner

College Name:	Code:
Department:	Date of Exam:

External Examiner's Feedback Form: Project–II for BE 8th Semester

(Submit Duly Filled & Signed form in sealed cover along with the internal examiner's feedback)

Academic Year: _____

Please submit the duly filled and signed from in a sealed cover (not along with mark sheets)

Name of the External Examiner: _____

_____

(Please also mention your parent institute code, in case you are a faculty member of a College, affiliated with GTU)

Project Title: _____

Project ID: _____ Branch: _____

Project Type: _____ ❑ IDP/ ❑ UDP (Tick suitable type)

Group Number (If any): _____

Comments/suggestions about the Project, if any:

_____

_____

_____

_____

_____

Performance Indicator of the Project Team (IDP/UDP):

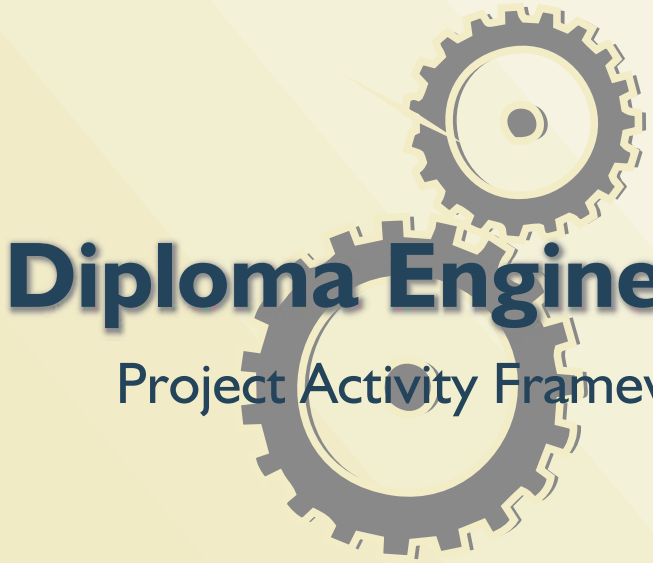
_____

_____

_____

_____

		Poor	Average	Good	Excellent
1.	Innovativeness and creativity within IDP / UDP as well as utility of the project for industry / academia or society				
2.	Identification and implementation of strategies and proper tools /techniques for project				
3.	Actual work and efforts				
4.	Clear understanding of the future course of action / modifications / project plan for the whole year with timeline to take it to the user level				
5.	Effective implementation of methodology of design-driven innovation through various Canvas exercise and thorough understanding of it				
6.	Originality of the content in the project report and synopsis, quality of data collection				
7.	Soft Skills - Communication Skills, team spirit *(if any for working in group)*				
8.	Efforts in making the prototype of the solution, testing and redesign				



Diploma Engineering

Project Activity Framework

IDP/UDP Credit Summary for Final Year Diploma Engineering Projects

Sr. No.	Branch	5th Semester Credits	6th Semester Credits
1	Diploma in Automobile Engineering	4	12
2	Diploma in Bio-Medical Engineering	4	12
3	Diploma in Chemical Engineering	-	8
4	Diploma in Civil Engineering	4	12
5	Diploma in Computer Engineering	4	12
6	Diploma in Electrical Engineering	4	12
7	Diploma in Electronics & Communication Engineering	4	12
8	Diploma in Environment Engineering	4	12
9	Diploma in Information Technology	4	12
10	Diploma in Instrumentation & Control Engineering	4	-
11	Diploma in Mechanical Engineering	4	12
12	Diploma in Mechatronics Engineering	4	12
13	Diploma in Metallurgy Engineering	-	7
14	Diploma in Mining Engineering	4	12
15	Diploma in Plastics Engineering	-	-
16	Diploma in Power Electronics	-	-
17	Diploma in Textile Processing Technology	-	-
18	Diploma in Textile Manufacturing Technology	-	5
19	Diploma in Architectural Assistantship	-	-
20	Diploma in Computer Aided Costume Design & Dress Making	4	12
21	Diploma in Ceramic Technology	-	30
22	Diploma in Commercial Art	-	25
23	Diploma in Commercial Practice	-	-
24	Diploma in Fabrication Technology	-	5
25	Diploma in Home Science	-	6
26	Diploma in Printing Technology	-	6
27	Diploma in Textile Designing	-	20
28	Diploma in Transportation Engineering	4	12

Note: While every efforts has been made to ensure the correctness of the credit system, in cases of any conflict or confusion user is advised to refer Syllabus for Diploma Engineering available on GTU website at: ***http://old.gtu.ac.in/syllabus.asp***

IDP/UDP Project Statement Form

(This is sample format & departments can modify it if they need as per required scenario & sector)

TITLE OF PROBLEM/PROJECT

DICIPLINARY | INTER-DICIPLINARY DISCIPLINE: _____

STUDENT PARTICULARS

	Name	Mobile No	Email ID
1.			
2.			
3.			
4.			
5.			

College Name: _____

College Code: _____ Branch: _____

Semester: _____ Year: _____

Team Name/Code *(to be given by the institute):*

_____

Signature of Students (Team Members)

INDUSTRY PARTICULARS/USER'S DETAIL

Industry Details

Name: _____

Address: _____

_____

Contact No.: Office: _____ Mobile: _____

Name of Industrial Estate: _____

Company logo (optional)

Industry Mentor Details

NAME: _____

MOBILE NO.: _____

EMAIL ID: _____

IDP/UDP Evaluation Guidelines to Internal and External Examiners

Diploma Engineering, Semester-VI

1.	Both internal and external examiner have to participate	The Internal and External Examiner both will have equal weightage in Evaluating the Project work.
2.	Industry mentor's comment matters	The Comments and Appreciation if any from industry mentor must be taken into consideration.
3.	Idea matters not just the size of project	The size of the Project should not matter inspite of that what should matter is the innovativeness of concept, the originality of concept and The usefulness of work.
4.	Partial completion can be tolerated for good, innovative big sized work	It is not necessary that work is to be completed fully, it may be a partial completion but if it is good work than it should be appreciated. A partially finished project having innovative and useful idea presented systematically, having purposefulness may get more marks than fully finished ordinary project work.
5.	Fully accomplished work may get extra points	The Very Good Project work and at the same time fully accomplished work must be rewarded as Good work to appreciate and motivate the students.
6.	See the extensibility of partially completed work	In case of Partial fulfilment give comments regarding the possible extension of work to the upcoming students.
7.	Model, circuit, demo video, animated film kind of support is must for defending the work	The student are expected to present their work using PPT presentation as well as the Models, The circuit Diagrams, the animated films, videos etc. If they have executed their work at industrial premise than they can show the video of the whole demo performed at industry to test the success of work.
8.	Comment on usefulness of work to industry/society	Every External Examiner must write the comment regarding the usefulness of work to industry/Society in the feedback form so that the same good work can be effectively passed on to the stakeholders.
9.	Sincerity, regularity and punctuality in work should be rewarded	Throughout the year how interactive students were with the industry people as well as with the Teacher matters while the process of evaluating students. Sincerity, Regularity and Punctuality In work should be rewarded.

10.	**Duplication of Work for many Group of same college should not be tolerated.**	Examiner should strictly write comment if same kind of work is taken as IDP by many group of students in same college. It should be strictly noted, and should be reflected in evaluation. IT is not right practice and the concerned Guide and HOD of Department must be informed not to allow students to do so.
11.	**Presentation/Documentation/ Analytical, statistical & Observational support matters…**	The Presentation/Documentation is also vital activity associated with IDP. Consider the assigned weightage of this factor also during Evaluation. The Analytical & statistical support to their work during the process of defending is to be appreciated.

Diploma Engineering: Feedback Form for External Examiner

(Filled and duly signed up form to be kept in sealed cover-not with mark sheets)

Name of The Internal Examiner with Exam Centre Code:_____

Institute name & Institute Code of external Examiner:_____

Date of Exam for IDP Part-II:_____

IDP Title:_____

The IDP status: ❑ Fully Completed/ ❑ Partially Completed/ ❑ Incomplete/ ❑ Yet to be Implemented

FULLY IMPLEMENTED IDP:

How was the overall organization and presentation? ❑ Excellent ❑ Good ❑ Fair ❑ Bad

How is the Literature survey work? ❑ Excellent ❑ Good ❑ Fair ❑ Bad

The marking of success in actual implementation of the idea conceived during IDP-I is

❑ Excellent ❑ Good ❑ Fair ❑ Bad

The level of Innovativeness and Usefulness of IDP is ❑ Excellent ❑ Good ❑ Fair ❑ Bad

Understanding of future modifications ad expansion of idea if any?

❑ Excellent ❑ Good ❑ Fair ❑ Bad

Examiners Comment:

_____

PARTIALLY IMPLEMENTED IDP:

How was the overall organization and presentation? ❑ Excellent ❑ Good ❑ Fair ❑ Bad

How is the Literature survey work? ❑ Excellent ❑ Good ❑ Fair ❑ Bad

The extent to which the work is partially completed. ❑ Excellent ❑ Good ❑ Fair ❑ Bad

The level of clarification about the work done till now and what is remained to be done and why?

❑ Excellent ❑ Good ❑ Fair ❑ Bad

Examiners Comment:

_____

Is this IDP Innovative and having extra potential? ❑ Yes ❑ No, ***If yes tick mark following***

❑ Financial support acquired

❑ Good Industry Mentoring

❑ There is any IPR/Copy Right support

❑ Possible to assign the work to forthcoming students?

External Examiner name & Sign.

Note:

The Internal Examiner should keep the matter filled up which is possible to fill up in advance and keep ready before scheduled Practical Examination.

Post Exam, Support provided by GTU Innovation Council (GIC)

Diploma Engineering, Semester-VIOptional participation for benefit of students who wants to further improve their projects/ideas

Category of Support	Description
IPR/Patenting/Licensing Support	• Through linking of various Govt. agencies who supports such cause • Patent Clinic Program at GTU Innovation Council
Crowd Funding	• Linkages for Grants (Linking to Govt. and potential agencies) • Crowd funding initiator (CFI)
Design and fabrication Support	• Linking to design clinic programs and design support systems for product design for selected projects • Fabrication support by CiC3 lab
Student Start-Up Support System (S4)	• Linking to (student Start-Up support system) S4 center of GTU Innovation Council • Linking to other potential incubators • Summer Start up leadership program • Entrepreneurs in residence (EIR) program • Linking with support system like Govt. Start-Up assistance scheme

General Note:

- Students may carry forward the project of Design Engineering subject from previous year as final year project. Those who are considering Design Engineering project for final year project and want to work on further development of the same need not to repeat the phases from Observation to Prototype as they have already implemented in Design Engineering. However the project report must include the work done from Observation onwards (i.e. Report must be self-sufficient). But they can further implement the project from prototype phase to make it marketable. Here faculty guide and students team need to work on schedule and implementation strategy for such cases.
- Those who will select new domain/definition for their final year project need to follow the above mentioned guidelines for final year.
- All the steps from phase 1 to 5 and later on from phase 7 to 10 can be iterative rather than strictly in linear fashion. Each team can run some steps in parallel and some in loop so that every insight derived from the process get suitably implemented while making the whole project.
- The weekly schedules is given taking general scenario in mind, one can reschedule it based on the project and work for each phase. But the continuous evaluation by faculty guide or industrial mentor must be done timely to upload PPR.
- As some projects need more than 1 year to reach to a stage of final product (ready to be used), the students and guides can take up such projects from previous years exactly from where it has been left by the previous teams. GTU believes that in little such iteration and cycles, many left out final year projects can be converted into a useful product for end users or successful Start-Ups.
- GTU is the 1st large state technological university which believes that by thoroughly crafted policies, processes, incentives and real-time mentoring and quality benchmarks at least 1000 B.Tech student projects can become useful product every year. Some of these innovations can possibly become successful technology Start-Ups or get transferred to MSMEs which in turn can use them for improving their proclivity and create value.

Additional GTU Support System for innovative project through various initiatives like "Project to Product" and "Mind to Market" are as below

Reference: http://files.gtu.ac.in/circulars/16Aug/01082016.pdf
http://www.gtu.ac.in/uploads/04082016.pdf

GTU Innovation Council (GIC) is India's 1st large scale university based innovation ecosystem in an affiliated type system. Since its inception in 2010 it has organically grown while intervening at all layers of innovation processes. One of the key facets of this Innovation movement has been students and technology youth has been the key driver for its agendas. In the process till now it has not only made pedagogic experiments at large scale but also proven various Indian models of innovation and pre incubation strategies impacting 100s of students in the state of Gujarat. Its implication and insights from the efforts have inspired both state and national policy makers who are shaping futuristic innovation and Start-Up agendas.

Following paragraphs in this part of document covers various supportive systems which were been started at GTU to further facilitate students to take forward their projects to next level. This support system includes services offered by the E-Library, GTU IPFC (IP Facilitation Center), Open Design school, CiC3 (Community innovation and Co-creation center), S4 (Student Start-Up Support System), GTU IT support section at GTU Innovation Council. Support system includes many other initiatives taken by these sections.

- **E-library:** E-library city center cum reading room provides flexibility for GTU students to access E-journals, E- Book's, and other E- resources at their convenience to enable the advancement of knowledge and discovery with no cost to students. Refer: ***http://www.gtu.ac.in/uploads/04082016.pdf*** *(Page no 17)*
  Website: ***http://gtuelibrary.edu.in/***

- **Open Design School:** GTU has introduced a creative and interactive practical approach of "Design Engineering" as part of students' curriculum. Design Engineering is very unique initiation of GTU based on globally accepted and implemented "Design Thinking" methodology by designers and engineers. GTU has trained large number of faculty about applying the concepts of design engineering in to learning and problem solving approaches, who had later on trained the students about fundamentals of design engineering.Refer: ***http://www.gtu.ac.in/uploads/04082016.pdf*** *(Page 10-11)*

- **CiC3 & S4:** help students and alumni, who have done good projects to carry the project forward by providing design support (through cic3) and entrepreneurial support (through s4), as required by the students, Refer: ***http://www.gtu.ac.in/uploads/04082016.pdf*** *(CiC3 Page 7-9 & S4 page 12-16)*
  Website: ***http://cic3.gtu.ac.in/***

- **GTU Sensor Lab:** GTU students and faculty are working on sensor based application development in Smart City research areas like as effective and feasible ways to coordinate urban technologies, developing new technologies for communication and dissemination, defining critical problems relating to cities, transport, energy and environment etc. GTU provides number of resources which are useful in developing prototype models.
  Refer: ***http://files.gtu.ac.in/circulars/15Oct/15102015_02.pdf***

- **GTU IPR Activities:** GTU has followed the path of faculty training, and there by huge efforts has been made to train faculty on different aspects of IPR. This trained faculty members transforms the learned knowledge to fellow colleagues and students at their respective colleges.

Brief outcome of GTU IPR activities includes:

- By all such workshops and seminar at present GTU has a very large pool of nearly 7100 trained faculty, who have been trained and made aware about the basics of IPR/Patents in particular and also for the basics of patent search methodologies.
- Due to these efforts, till today more than 354 provisional and complete Patent applications have been filed by students and faculty of GTU affiliated colleges.
- Via Patent Search and Analysis Report (PSAR) generation activity, more than 1,19,000 students have studied and prepared more than 6,03,000 patent search and analysis reports and these have been uploaded on the web-site by studying equal number of patents during the three academic year 2013-14 to 2015-16.
- Via PDE activity, more than 42,000 provisional patent documents have been drafted as learning exercise by students in three academic years 2013-14 to 2015-16.
- GTU has also started very unique kind of Post Graduate Diploma in Patent's Law (PGDIPR) and six months certificate course on IP valuation & Management (IPVM).
  Refer: ***http://www.gtu.ac.in/uploads/04082016.pdf***

- **Patent Clinic:** Once students complete their research projects during academic year and if the research problem and the solutions of a particular student team is unique and innovative, GTU helps students to decide whether their projects are patentable or not. GTU also helps the students to draft and file the patent for their innovation. For this purpose, GTU has started a series of 2-days workshops on "Patent Search, Drafting and Filing" called as "Patent Clinic". Till August 2016, 25 such Patent Clinics have been organized successfully, where in nearly 1400 students and faculty have taken part and get benefited.
  Refer: ***http://files.gtu.ac.in/circulars/16May/16052016_15.pdf***
  Website: ***http://gtuipr.gtu.ac.in/***

Crowd Funding Initiatives (CFI)

Refer: *http://gtu.ac.in/circulars/14Jun/03062014_02.pdf*

Crowd-funding is the practice of funding a project or venture by raising small amounts of money from a large number of people. More than 90% of student Start-Ups, based on good ideas and prototypes, die a premature death despite having a huge potential. Most of them also suffer from incomplete market research. Crowd-funding permits the use of the connected world as a market research tool for innovative ventures, which want to find their target consumers. By using crowd-funding a budding entrepreneur can market the concept to numerous stakeholders, can get insightful inputs from them and can obtain help in product validation. In addition, of course, Crowd-funding can help raise funds during the crucial phase of product development.

Crowd Funding Initiator (CFI) is an effort to make the potential entrepreneurs & innovators funding-ready through use of this internationally successful tool called "Crowd". The month long module of CFI includes focused sessions with industry experts, case studies, mentor session and hands-on-exercise on different aspects of crowd-funding with selected finalists. At the end of the programme, all the selected finalists go live on a dedicated crowd-funding platforms and not only learn how to get funded but "do-it themselves".

GTU Student Start-Up Policy

GTU Student Start-Up Policy: *http://files.gtu.ac.in/circulars/14DEC/05122014_02.pdf*

More than 94 % engineering students are now in affiliating-type universities in India. On the other hand all the national innovation and Start-Up policies cater to the segment of single campus/residential engineering campuses like IITs, NITs etc. Therefore if the majority of engineering students are not to remain outside the ambit of national Start-Up policies, a Student Start-Up Policy for such universities is very essential.

From the available demographic data, it is evident that, to satisfy the need of university graduates, India needs to create nearly 1 million jobs every month for the next decade. While the public sector industries and large private sector industries would play their role, jointly they would be able to create only a fraction of the requirement. The only way to address this problem is to promote student Start-Up culture across the universities.

The Union and State governments are focusing on a skilled India. It has been seen that students, who have gone through exposure of entrepreneurial endeavors, understand the importance of learning practical technological as well as soft skills and graduate out with much better skill-sets. In a University, where the number of successful entrepreneurs increases, it is observed that the entire cohort of students start showing a greater interest in acquiring necessary skills. It has been seen that enterprise education/ exposure and potential for better employment are correlated. Thus through the proposed student Start-Up policy by GTU, the State Universities will be able to contribute significantly to the skilled India mission of the Honorable Prime-Minister.

GTU's Technology and Business Incubator/Nodal Institute

Refer: *http://files.gtu.ac.in/circulars/16Jun/20062016_02.pdf* and
GTU's Technology and Business Incubator Guidelines:
http://files.gtu.ac.in/circulars/16Feb/04022016.pdf

GTU Technology and Business Incubator (GTU-TBI) will incubate companies, based on ideas and technologies developed by the budding entrepreneurs. In recent years, GTU has been encouraging its faculty members, staff, research scholars and students to convert their ideas and innovations into commercial ventures for personal, institutional and social benefits. This process of translating knowledge in various disciplines of science and engineering into products, processes and services for commercial exploitation will benefit the society by creating both job as well as wealth for the society.

GTU is approved Nodal Institute and will help startups based on product, process and service as mentioned in "scheme for assistance for Startups/Innovation under new industrial policy" 2015 for channelizing the State Government's Support to deserving Start-Ups. All startups incubated/selected at GTU-TBI and any proposal having innovative project/prototype can apply for assistance provided by Government of Gujarat. This provides further support to take suitable projects to the next stage.

Minor and Specialization in Technology Entrepreneurship

For More Detail Refer:

http://files.gtu.ac.in/circulars/15DEC/03122015_02.pdf
http://gtu.ac.in/circulars/15June/29062015_04.pdf
http://gtuinnovationcouncil.ac.in/filer/2407201512746.pdf

GTU has offered Minor and Specialization course in Technology Entrepreneurship as an optional additional learning in Bachelors of Engineering. GTU students pursuing their B.E. and having an entrepreneurial mind set, who are self-motivated and self-disciplined with ability for self-learning will now have an option to work for their additional optional coursework at any of the GTU empaneled incubator or Start-Up support institution.

Brief idea about the programs is described below:

Minor in Technology Entrepreneurship: A student will need to undertake additional courses and earn 15 additional credits over and above the minimum requirement for Bachelor of Engineering degree to earn Minor in Technology Entrepreneurship. These 15 credits will be divided in three semester i.e., 5 credits (75 Hrs.) in each semester.

Specialization in Technology Entrepreneurship: There are no credits and hours of engagement in the specialization. The student will be evaluated on the basis of following points:

- Revenue Realized – The team should have been able to earn revenue either from a single product or cumulatively for all its products
- Profits Generated - The team should have been able to generate a profit either from a single product or cumulatively for its products
- Angel/Venture Funding – The team should have been able to raise an angel or venture capital funding for its startup by way of dilution of equity shares.
- Patent Granted – The team should be able to win a Patent Grant in India or anywhere in the world for its product.

Awards & Certificates

Refer: *http://files.gtu.ac.in/circulars/16JAN/13012016.pdf*

Reports:

4th Innovation Sankul Day Celebration-*http://www.gtu.ac.in/circulars/15Apr/13042015_01.pdf*

3rd Innovation Sankul Day Celebration-*http://www.gtu.ac.in/circulars/14Jun/06062014.pdf*

2nd Innovation Sankul Day Celebration-*http://gtu.ac.in/circulars/13Feb/TheCelebration_Ver.pdf*

Website: *http://awards.gtu.ac.in/*

To appreciate the good efforts made by students for innovative project development, as to appreciate and facilitate faculty, HOD, Principal or trustees who had set up innovative practices for cultivating the innovative environment at respective institutes, GTU innovation Council declares the various categories of awards on 14th February of every year, and celebrate this day as a "Sankul Day".

- **Pedagogic Innovation Awards:** The Pedagogic Innovation Awards are for recognizing the work at an individual and at an institutional level. Via this award GIC is trying to include all notable efforts, which have helped GTU Innovation Council in setting a new benchmark in the innovation ecosystems itself. GIC believes that by acknowledging such innovations adopted by an individual faculty or an institute, these may be codified and documented. This will help scale up such initiatives all across GTU and beyond. Learning from the innovative steps, adopted by an individual faculty or an institute, will not only inspire more than 17,000 faculties within GTU but thousands of them from all other universities across the nation.

- **Innovative Students' Co-Creation Awards for Leadership and Excellence (i-SCALE):** i-SCALE have been awarded to recognize student-led initiatives in the fields of innovation, technology development, pedagogy, leadership, entrepreneurship and similar other endeavours. The Awards are not for discrete individuals. The Awards will be given to core team members who might have led such initiatives for a significant amount of time during their college time. The teams, whose members have graduated during the past two years at GTU are also eligible for the Awards.

- **GIC i2i (Innovate to Impact) Award:** GTU Innovation Council has declared GIC i2i (Innovate to Impact) to recognize innovative projects of students across GTU affiliated colleges in Engineering, Polytechnic, Pharmacy, MCA, MBA and others. Students of Diploma, Degree, Masters and PhD program can nominate their innovations for this coveted award which is been awarded 14th February of every year during GTU Innovation Sankul day. Student's projects which address an important social, technological problem faced by masses or disadvantaged people/sectors/spaces or micro and small enterprises or have the potential to impact a pressing national need may nominate themselves. Student innovations of past 3 years including current academic year can apply for this award online. Faculty guides can apply on behalf of the students, who have completed their studies, if they are not available in colleges.

Start-Up MOOC: "Six ways: Introduction to Student Start-Ups"

www.gtu.ac.in/startupmooc

Prime Minister Narendra Modi urged the nation "Start-Up India, Stand-up India" from the Red Fort on 15th August 2015. GTU has contributed to this appeal significantly through its Student Start-Up activities and allied interventions catering to nearly half a million students across 450 colleges. Gujarat Technological University (GTU) and Start-Up Village together are now launching the country's largest Student Start-Up literacy program through Massive Open Online Course (MOOC): "Six ways: Introduction to Student Start-Ups". More than 25,000 BE students have registered for this program by now for its 1st edition.

This will probably be India's largest MOOC Start-Up aspirants wherein students will learn how students across countries have done inspiring efforts and created technology innovation driven Start-Ups right in their colleges. This free but highly relevant program for students will make them aware about nuances of making a technology Start-Up primarily based on the innovative final year projects which they do every year. This course will also inspire students to become job creators and contribute significantly to economy and employment generation.

This program will be implemented across GTU under its unique initiative namely, 100 point activity system. This program will share success stories of unique student Start-Ups from across the country and also share about Start-Up ecosystem in India. While 15,000 student projects are done in GTU every year where each student invest its 1 year, this program will aim at creating awareness right in the beginning so that at least 3 % of these innovative projects become student Start-Ups. The program will also help evaluating the understanding of the students at the end of every module and after successful completion of the program each student will get a certificate and they will fetch 9 activity points. Primarily this program will instil confidence among young students that they can even start up in college if they solve a real life challenge and create innovative solutions.

This program will help in understanding the fact that, if they Start-Up early they can benefit through various ways like: a) Get funded b) Join a Start-Up accelerator c) Get acqui-hired d) Become self sustainable e) Get a job f) Go for higher education. Start-Up village is hosting this online program exclusively for GTU students. While the program will be mandatory for all 3rd Semester students under MOOC program of 100 activity points it can be availed to all other students from other semesters too.

This will rejuvenate the Yuva Shakti in the state and each of them will play pivotal role towards Gatisheel Gujarat. Recently AICTE took notice of GTU Start-Up efforts and is trying to scale such things across the country.

How we build the University innovation & Start-Up Ecosystem brick by brick: Insights from GTU Innovation Council

Sr. No.	Intervention	Target Segment	Year	Implication	Comment
1.	Innovation process design around final year projects through pedagogic and allied interventions. http://www.gtu.ac.in/uploads/GIC%20Compendium%20IDP-UDP.pdf	All Degree Eng and Diploma students of GTU across 200 colleges , Nearly 60,000	2011 onwards , 5 cycle of yearly efforts	Fundamental mindset changes focus on project to product, mind to market etc. Shifting faculty interest and making base for over all innovation and Start-Up experiments	University level pedagogic push being executed at college level / Department level
2.	Set up a full fledged operation as main stream section under university PMU to steer every policy to action related to innovation and Start-Ups. Ref www.gtuinnovationcouncil.ac.in	All key stakeholders within the university and outsiders , huge focus on banking on external expertise and internal drive with specific focus at university to make it a major agenda	2010 onwards with both short term and long term interventions which are inter connected and interdependent	Strong cultural change, allowed university to focus and deploy time bound strategy, streamlined other fundamental efforts of University with it and develop process and institutional mechanism hand in hand	University level intervention
3.	GTU Innovation Clubs http://www.gtu.ac.in/uploads/15092016.pdf	All non pedagogic efforts at college level & deploying GIC efforts and university pedagogic interventions on innovation and Start-Ups	2010 onwards and time to time updated on its mandate and way of functioning based on contemporary needs	Grassroots level deployment of all desired goals. Engaging students and making it a student centric movement	College level interventions with specific mandate driven by students and faculty members
4.	GTU innovation Sankuls/Clusters http://gtuinnovationcouncil.ac.in/sankuls/ . 500 college and 72 industry clusters divided in 25 Innovation sankuls.	Regional/cluster level interventions and co creation to cement the efforts of University level with college level. Co-create with local SME clusters and average 15-20 colleges of GTU with other civil society stakeholders. Non pedagogic, community driven approach with collaboration and lateral learning	2010 onwards and mandate keeps varying based on various incremental addition of policy interventions on innovation & Start-Ups.	This links top level university efforts to ground and contextualise policy agendas with respect to particular geography.	Cluster level, broadly non pedagogic, collaboration driven efforts (not optional)
5.	100 activity points for every BE student, http://files.gtu.ac.in/circulars/15DEC/16122015_01.pdf	All BE students , nearly 1.5 lac across 118 colleges	2015 onwards with continuous update in its mandate in agile ways	Direct incentives for all students to participate in innovation, Start-Up related activities as a requirement of degree.	Policy intervention with direct implications , efforts cantered at students but moderated by others like teachers, external experts, etc
6.	IPR interventions for ensuring novelty in process and product part of innovation value chain, http://www.gtu.ac.in/uploads/GTUIPRMissionBooklet_13082016.pdf	All Be students , faculty guides of projects, innovation clubs , 40,000 student per year	2011 onwards with continuous value addition in the process and impact	It improves quality of projects and strong literacy which in turn convert more innovation driven tech enabled Start-Ups	Directly applicable to all final year students though others are allowed to benefit from it through non pedagogic interventions too

How we build the University innovation & Start-Up Ecosystem brick by brick: Insights from GTU Innovation Council

Sr. No.	Intervention	Target Segment	Year	Implication	Comment
7.	PMMS, Project monitoring and mentoring platform : http://projects.gtu.ac.in/	All final year BE students , 45,000 plus their faculty guides, HODs and directors of colleges , total 60,000 regular users	2015 onwards with necessary feature and function addition every year in IDP/UDP process	Real time tracking, analytics, monitoring and mentoring for every single student project in GTU across all BE colleges	Technology enabled platform helps in real time sensing, regulating and facilitating the project/innovation process through projects in final year
8.	Fab lab/design/co creation www.cic3.gtu.ac.in	Non pedagogic interventions but best projects can take exclusive help to build proof of concept of their idea/project/innovation	2014 onwards with addition of activities and adding more support systems across final year project/innovation value chain	Help in prototyping ideas, promote hardware innovation and Start-Ups, support hub and spoke model of makers movement , taking proof of concepts a step ahead	This is non pedagogic effort in distributed manner but sooner it will trickle down its best practices to college level efforts
9.	GTU student Start-Up Policy http://files.gtu.ac.in/circulars/14DEC/05122014_02.pdf	All students , colleges and other actors associated with student Start-Up movement	2014 onwards with incremental addition of strategies time to time based on need across the need of student Start-Up value chain	This policy gave a platform to integrate various efforts around innovation; Start-Ups etc and create incentives at all layers so that end to end support system is built.	This covers both pedagogic, non pedagogic efforts with larger prospective and keeping the policy agile in itself
10.	Start-Up MOOC : large scale Start-Up literacy program http://files.gtu.ac.in/circulars/16JUL/14072016_01.pdf	All 2nd year Engineering students of GTU, around 40,000 students. Even students from students from other semesters can leverage this	2016 academic year onwards , this is a mandatory effort to bring large scale literacy among students on benefit on early stage Start-Ups right in college days	This is aimed at creating horizontal spreading of the Start-Up efforts across GTU.It will explain nuances of the Start-Up processes	This is successful example of leveraging 100 activity points and deploy key agendas/processes aimed at students at large scale
11.	B. Tech, Minor & Specialisation in Technology Entrepreneurship http://files.gtu.ac.in/circulars/16Jun/29062016_01.pdf	This is an effort to give specific support to selected potential student Start-Ups at different stake involving available incubators and other such supports within and outside formal GTU academic system	2015 academic year onwards , this is a pedagogic intervention but expert external stakeholders like TBIs, incubators are involved	This allows university to involved experts and institutions related to Start-Ups from outside and streamline some of its efforts end to end. This allows the process to become more professional and student Start-Ups get perfect incubation, funding and allied environment.	University has integrated processes systematically so that interventions are done both at scale which creates access equality and also integrate supports vertically so that selected deserving potential students benefit from these.

How we build the University innovation & Start-Up Ecosystem brick by brick: Insights from GTU Innovation Council

Sr. No.	Intervention	Target Segment	Year	Implication	Comment
12.	Develop design driven innovation process, build strong culture of product innovations http://old.gtu.ac.in/syllabus/NEW%20BE/Design_Engg/Guideline_Design_engg.pdf	This reaches to nearly 60,000 students as its now being implemented through curriculum interventions. Though it started as pilot design boot camps, now it has been developed and streamlined to get implemented across all BE colleges.	2015 academic year onwards for all BE students after 3rd Semester in the cycle. This process adds on depth in subsequent semesters and enable them with processes like design thinking & Product design/innovation.	It involves expertise from both within and market and build capacity at college level through faculty members so that it reach to mass of students in systematic manner. Though every year based on the inputs from experts and feedback from past implementation process value addition is done every cycle in this.	To enable students to better articulate challenges and solve real life issues/innovations. Start-Ups can be built around these solutions and such a large scale deploy will create basic literacy of the processes and give new skill sets to students at early days.
13.	Student Start-Up Support System (S4) http://www.gtu.ac.in/uploads/04082016.pdf	S4 is the pre incubation support system for most of the student Start-Up related efforts at GTU. It operates both in hub and spoke manner and monitored through its central operation. More than 25,000 students are direct beneficiary of this program and huge pool of Start-Up ecosystem actors extends support to student Start-Ups through this.	From academic year 2013 onwards. Primarily it covers non pedagogic co curricular interventions for students and other capacity building measures in case of hub and spoke efforts down the line in the 3 layer innovation ecosystem at university.	This single intervention has tried to involve max stakeholders from local Start-Up ecosystem, public and private sector and engage them with main stream innovation and Start-Up efforts at GTU and its affiliated colleges.	This model redefines the pre incubation process particularly for a state affiliated distributed type of system. This model both intervenes through discrete activity and process mode and time to time convert some of the best practices as academic policies.
14.	GTU Technology Business Incubator , http://gtuinnovationcouncil.ac.in/incubator/	This facility further support selected student Start-Ups who have commitment and potential to excel in next 1-2 years. Generally the best spin offs from the pre incubation pipeline creates linkage here.	From 2015 onwards it's formally in place. It's having capacity to nurture around 15 Start-Ups physically at a time. It also extends virtual support to few remote Start-Ups who are physically not located at central support system.	From all the above processes when a culture is built, pre incubation helps in fine tuning ideas, this full time TBI helps selected innovations to be further groomed so that they reach market and scale. GTU is only state technology university to have this.	This support system fills the gap of end to end support system available. While all the above are mainly efforts at scale to build a strong culture of innovation and Start-Ups across GTU this support is selective but intensive.

How we build the University innovation & Start-Up Ecosystem brick by brick: Insights from GTU Innovation Council

Sr. No.	Intervention	Target Segment	Year	Implication	Comment
15.	Nodal Institute for availing support from Start-Up assistance scheme of Govt. of Gujarat , http://files.gtu.ac.in/circulars/16Jun/20062016_02.pdf	This facility helps young innovators and Start-Ups to directly avail state govt. Start-Up assistance scheme like sustenance allowance, prototyping cost, marketing cost etc. GTU is one of the key nodal institute of the state govt. to extend its support to young Start-Ups .	From 2016 onwards in place and 1st cycle of Start-Up funding support is being extended. Though this will extend support to selected no of young innovators, Start-Ups it helps to motivate the early stage student Start-Ups to continuously improve and innovate so that they can avail state support through University facility.	This financial support is also extended to student Start-Ups and Start-Ups by GTU Alumni beyond GTU's regular incubation process. This brings in also mentoring facility along with creating market access for products and services of benefiting Start-Ups. Though govt support is mainly for funding and mentoring we are extending other auxiliary supports too to the early stage Start-Ups/student Start-Ups.	This is also a facility extend for selected teams. This motivates young students to start early. Once students benefit and rigorously participate through above mention support created across the innovation and Start-Up value chain in GTU, such supports adds value to them. Such end to end supports and processes create a holistic innovation ecosystem by any state / affiliated type university having nearly half a million students.

Note: Special feature of the University innovation & Start-Up Ecosystem at GTU are

1. Distributed model
2. Both pedagogic and non pedagogic interventions
3. Strong institution building mechanism based on proven processes
4. Suitable incentive design
5. Inclusive participation of actors both within and outside the university
6. Developing disruptive policy models and deploying at grassroots level
7. Intervening at every step of innovation & Start-Up value chain and building a sustainable ecosystem at large
8. Fast learning and implementing best practices and developing next practices to work both at scale and depth
9. Helping in shaping national and state policy agendas based on insights from own efforts
10. One of the most frugal innovation and Start-Up ecosystem by its design and execution

AICTE Chairman Prof. Anil SahasrabudheVisits CiC3 Centre

Innovators Getting Devang Mehta Innovation Award

Hon. CM Shree Vijay Rupani visits
GTU Innovators at Start-Up Summit

Annual GTU Innovation Sankul Day

MOU with NASSCOM for skill Development

I st Industrial Shodh Yatra by GIC Students

Hackathon in GTU Central Techfest 2016

GIC Innovator Winning GYTI National Award

GTU Innovators with VC GTU at Mahatma Mandir

Robocopter Competition

Hackathon at S4

Industry Academia Meet at Sankul Level

GIC Student Associateship Program

Social Entrepreneurship Camp

Weekend Bootcamps at GIC

AICTE Start-Up Policy Conference

Infosys Co-Founder Kris Gopalakrishnan with Student Start-Ups at GTU GIC

GIC Getting National Award for Efforts to Link Industry and Academia

S4 Initiative of GTU is Country's 1st Large Scale Pre Incubation System

Crowdfunding Efforts at GIC

Important Details

1. GTU Innovation Council : 2nd August 2010.
2. GTU IPR Cell : 3rd September 2011.
3. GTU Student Start-Up Support System (S4) : 25th February , 2012.
4. The S4 Co-Creation Center (S4-C3) to provide Co-Working space for Start-Ups was started on 2nd March 2013.
5. The C-i-C3 (Community innovation Co-Creation Center) has been working since 1st May 2013.
6. GTU got approval for full-fledged Technology Business Incubator, TBI supported by DST, Govt. of India on 14th December 2015.
7. GTU launched 100 point activity system for all round development of students to become holistic and skilled engineer on June, 2015
8. GTU initiated Start-Up MOOC to wide scale Start-Up literacy among students at early stage on 14th July 2016
9. AICTE took notice of student Start-Up efforts of GTU and making efforts to scale such grassroots activities across the nation from academic year 2016-17 to start with : July, 2016
10. First University incubator as nodal institute to provide seed fund to student Start-Up : October, 2016

Convener

Mr. Hiranmay Mahanta
Honorary Director, GTU Innovation Council

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ABOUT GTU: Gujarat Technological University (GTU): a relatively new technology University established by Government of Gujarat, which opened its doors to students in 2008; GTU is the state's most comprehensive intellectual resource today. GTU at its current pace is in the process of becoming one of the fastest growing international innovative University in the country and aims to be leading national research University.

GTU at a Glance:

- 4,50,000 students.
- 440 affiliated colleges and 17,000 faculty members.
- Engineering, Pharmacy, Management, Computer Application, and Architecture.
- 67 Master's Doctoral Programs.
- Fourteen PG Research Centers and Schools in Technology, Policy and Skills.
- Internationalization program with 62 Professors from North America and Europe as Adjunct Professors at GTU
- Programs in IPR, Innovation, Start-ups, and Co Creation activities.
- Syllabi: permeated with Design Thinking; spine of Design Engg. in 6 semesters of UG Engineering.
- Industry orientation - 100,000 plus students visiting industries to identify industry problem and then take up challenge to solve it.

We hope that GTU's graduates will build a new India, which may stand for a more harmonious and more humane world, with a better quality of life for all.

Gujarat Technological University

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