



BEST PRACTICE

1. Title of the Practice

Project Based Learning for B.E./B.Tech Students

2. Objectives of the Practice

Project Based Learning strives to

- Create a student-centric teaching-learning process.
- Develop socially relevant engineering projects & project ideas.
- Create socially responsible engineers, thereby supporting the development of the social system.
- Give real-time exposure of engineering projects with industry standards.
- Equip the candidates with necessary skills and technical knowledge required for placement.
- Enhance the communications skills and soft skills of the students.

3. The Context

KCT Project Based Learning Framework attempts to provide experiential learning aligned with real-world problems to the students pursuing higher education. This serves as a unique model from other existing types by serving as a nexus of Project and Problem Based learning. This was introduced in the year 2020-21 for the selected students of first year B.E./B.Tech. to foster a strong synergy in the basic sciences and mathematics along with their application in multiple domains of engineering. The synergy of bottom-up model of Deep Learning and the top-down model of Project Making exercise provides the right blend of learning ecosystem to the students. In this model, the learning happens through providing scientific or engineering design

solutions to the existing real-world problems, and it covers the entire foundational core concepts of science and engineering thereby providing a preamble to the project making exercise. This strongly serves to be a student-centred approach of learning, where the faculty members become facilitators and co-learners.

4. The Practice

The learners of PBL collaborate in smaller teams and identify a problem statement, deep dive into the problem together as a team, arrive at plausible solutions under the guidance of mentors. The learners shall seamlessly explore the interconnections among multiple domains such as science, mathematics, technology, management and much more. While faculty mentors shall guide the learners with the basic science and math concepts and their engineering praxis, the alumni mentors extend their support in orienting the learners on the domain-specific application through appropriate technological intervention. The industry mentors have a significant impact in connecting the deep learning occurring in PBL Framework with the real-time application. Each project team will be reviewed at least 3 times on the progress of the project during a semester. A Final Project Presentation will be made with eminent experts from industry as reviewers. The assessments are carried out based on the originality of the work, probability of executing the proposed solution, uniqueness of the design, efforts put in by the candidate, and so on.

5. Evidence of Success

This type of learning enables the candidates to develop their skills in searching for relevant information, apply the course content to real-world problems and think for possible solutions across the disciplines. The learners take up projects with industry standards and work to provide technology solutions to the existing real-world problems and engage themselves in active learning. Total outcomes so far include 98 projects, 1 patent, 41 prototypes, 12 internships for I year students and 20 research publications. One of the phenomenal outcomes was that 7 second-year students of engineering who

were trained through this framework designed an energy-efficient boat without any prior experience of making boats and participated in an international competition titled Monaco Energy Boat Challenge 2022. The team successfully secured the sixth position in the challenge and was able to win the Communication Prize worth 2000 Euros. The learners through this mode have also participated in many national-level competitions and won prizes.

6. Problem Encountered and Resources Required

It is pertinent that any new pedagogy introduced will have their own shortcomings. One of the major challenges in this model is that the students have to cope up with both their regular learning and they have to make projects additionally. It was noted that a few students find it very difficult to manage. Therefore, in order to overcome the situation, the selection process has been made stringent and this model is provided to a minimal strength of around five to ten percentage of the learners. We are on the process of establishing a separate working space for the learners to carry out their projects. Lab facilities in research centres and other departments are also used to carry out the projects.

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KUMARAGURU
college of technology
character is life

Institutional Best Practices

1. Title of the Practice: ProtoSem – Prototype Semester

2. Objectives of the Practice

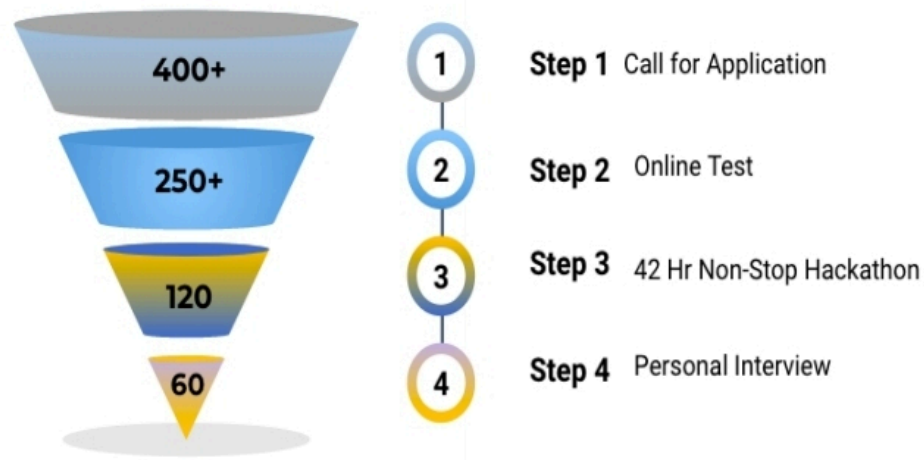
ProtoSem is an Open Innovation Fellowship Program, designed and developed by KCT-Forge Academy embedding an innovation-centred approach to engineering education. The program enables students with the necessary skills and competencies to solve real-world problems and develop tech-enabled solutions for the needs of industry, corporations, startups, and society.

3. The Context

ProtoSem imparts practical, conceptual knowledge through co-creation opportunities, which has proven to enhance the employability of students and sets towards an accelerated career path. Students spend 20 Weeks in the integrated Lab Ecosystem that enables them to develop solutions using 3D Printing, Embedded Systems, ML, Robotics, AR/VR, and IoT. Students are trained by Experts through training sessions & prototyping that gives hands-on exposure with Agile Methodologies and Product Management. Selection of students is carried out through a 3 step process, considers student's curiosity, learnability, drive, and attitude.

- Help students understand the importance of Innovation skills
- Learning from the traditional system for a transdisciplinary program
- Time consuming process of selection evaluates the student under various verticals of problem solving, mindset to team player

- Scholarships/Financial supports are given to outstanding meritorious students
- Leverage learning advanced technologies and build a Minimum Usable Prototype



4. The Practice

- **Learning by doing** is to learn the process of innovation by doing
- **Values & Ethics:** Innovation Engineers learn and implement agile practices to be self-sufficient to manage and impart right ethics
- **Product Innovations:** Students work in transdisciplinary teams go through a defined process for developing a product innovation
- **Skill building:** Rubrics showcase the key skill areas defined in various technologies to catalyse product innovations and to create innovation engineers
- **Co-create with Industry/Start-ups** - Teams interact with industry/start-ups on a regular basis, understand and align to product innovation with agile methods on a day-to-day basis
- **Curriculum** is built by the best practices used in industry, facilitated by industry experts

Uniqueness

Market Place - Challenge statements are shared to select the challenge. Team identifies Visionary - who leads the team, Hacker - does technical job to outcomes, Designer - brings a creative approach to solutions.

Step2
Interviews and Discussions -
Create your name card in the same color as the role you chose to play. Against your name list the top three skills you can contribute to the team in the given roles perspective

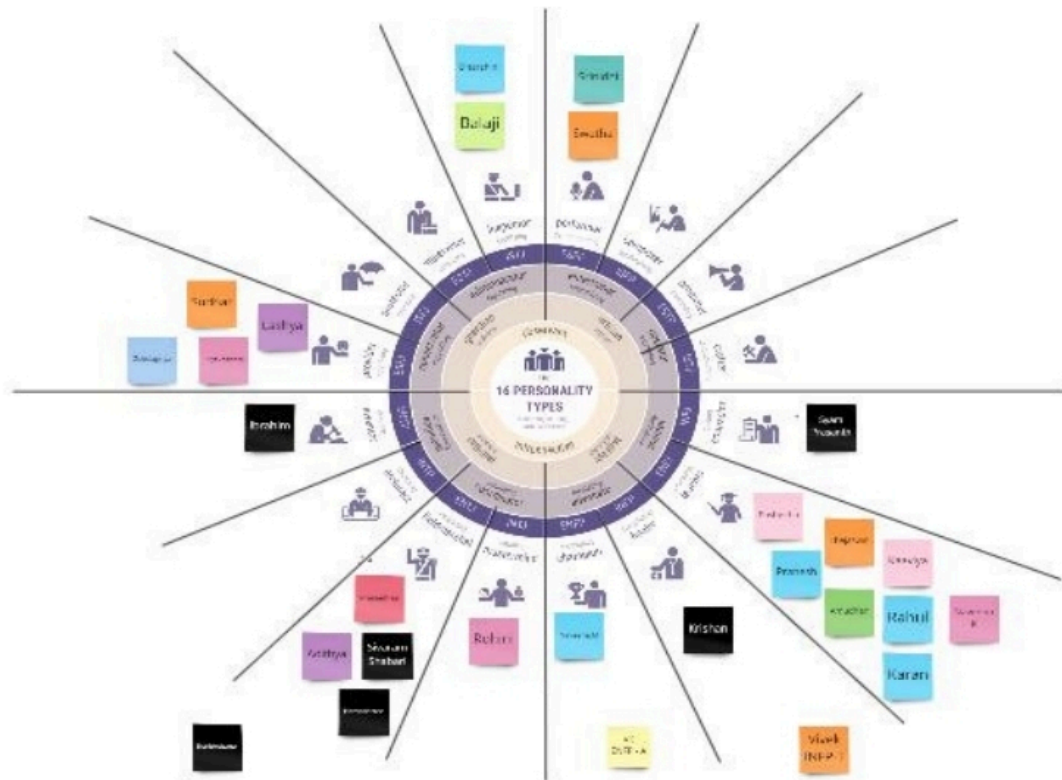
Gojapriya (IT) - Team management - Research and analysis - Adapt and manage with challenges	M Naveen Kumar (MECH) - Team management - Research and analysis - Adapt and manage with challenges	Abrahim Kaif (CSE) - Full stack developer - Machine learning - Research and analysis	Narmadha (CSE) - Back end developer - Worked with natural language processing - Good at python programming and web services
Lashya (CSE) - Working and getting a team in a good manner - Good in analysis - Adapt and manage with challenges	Kavin Kumar R (Prod) - Team management - CAD designer - Strategic thinking	RAHUL (EEE) - Controller - C programming - Simulation	Snehaathra (CSE) - Web developer - Has a lot of experience in java programming and C - Worked with natural language processing
Narmadha (CSE) - Full stack developer - Machine learning - Research and analysis	Sivaram Shubani (CSE) - Team management - Research and analysis - Adapt and manage with challenges	Balaji (ECE) - Worked with controllers - Know how to program using MATLAB and CCS - Know how to use communication systems	Priya (CSE) - Full stack developer - Good at programming in java, C - Have a lot of experience in web services
Pranesh (CSE) - Good at analysis and decision making - Good at analysis and decision making - Good at analysis and decision making	Thejaswini (CSE) - Strategic planning - Team player - Emotional intelligence	Rohini (CSE) - Full stack developer - Back end developer - Intermediate level in java and python	Amudhan (CSE) - Has a lot of experience with programming - Has a lot of experience with programming - Has a lot of experience with programming
Indrakeshi (IT) - Managing and leading a team - Team leadership and management - Managing and leading a team	KARAN AUE - Team management - Research and analysis - Adapt and manage with challenges	Adithya (CSE) - Highly adaptive - Python, C++, ROS, ROS2, Rust, Prolog - Data Science, SD and IoT experience	Amudhan (CSE) - Has a lot of experience with programming - Has a lot of experience with programming - Has a lot of experience with programming
Krishani - Team player - Adapt and manage with challenges - Adapt and manage with challenges	Indrakeshi (IT) - Managing and leading a team - Team leadership and management - Managing and leading a team		

Values and Corporate Practices - Students are trained on project management tools to Plan, Organise, Review, Meet and discuss day to day action plans and execute the work in the most effective manner.

Zen Pencils is an online showcase to feature illustrations taking on famous quotations and making a visual style to create a story. Students choose a comic strip that suits/inspire enough to pursue their life dreams. This activity helped to understand, identify individual's goals and aspirations.



16 - Personalities Circle is a psychometric test to learn what drives, inspires, and worries different personality types, helping to build meaningful relationships within cohort. It helps to make the best possible combination of people in a team. This activity is carried out at the start and end of *ProtoSem* to show them how their personality has improved and showcase how awesome they are.



Collaborative Cohort aims to break stereotypic behaviours of individuals and process to look for new friends, new people, new ideas and accept newer ones with open-mindedness to achieve team outcomes.

Beta Team 2					
Team 1	VK	Balaji R	Rahul	Chandrasekhar	Aravindhan
Team 2	Deepak	Ibrahim	Krishan	Rohini	Priya S
Team 3	Vivek	Chandrasekhar	Aravindhan	Pranesh	Aravindhan
Team 4	Aravindhan	Sivaram Shabari	Chandrasekhar	Aravindhan	Aravindhan
Team 5	Aravindhan	Aravindhan	Naveena K	Aravindhan	Srinidhi
Team 6	Vivek	Aravindhan	Syam Prasad	Aravindhan	Aravindhan
Team 7	VK	Deepak	Aravindhan	Aravindhan	Aravindhan
Team 8	Aravindhan	Naveena R	Aravindhan	Karan	Kavin Kumar R

Movie Time is a part of ProtoSem, imparting some important lessons by on-screen performances. Movie titles include Spare Parts starring George Lopez, which sets the life at ProtoSem and expectations. Coach Carter, Remember the Titans, Internet's Boy and Ted Talks are other screenings that happen.

Game Nights are introduced to international board games to build stronger relationships with fellow teammates and resilient cohort. This helps in identifying key personality traits of individuals and Four major games include RISK - Game of Global Domination, Pandemic, Resistance and Scotland Yard.



Agile Game



Marshmallow Challenge



Longest Floating Paper Flight

- **Drawsaurus** opens up the minds and getting adapted to ProtoSem culture. With learning & fun, students break boundaries of emotional barriers and increase productivity.

5. Evidence of Success

From 9 batches of ProtoSem, there were 345 Innovation engineers trained to develop 81 product innovations. From these, 4 teams have filed patent applications and 4 teams have registered to be a start-ups. Around 30 Lakh investment was raised from Corporate and Government Organisations. 86 innovation mentors from various domains, mentored to develop their MUP.



345 Innovation Engineers



4 Patents Published



81 Product Innovations



4 Startups



27 Industry Partnership



30L Investment Raised from
Corporate / Govt organizations



86 Innovation Mentors

Product Innovations

Smart Glove for Assisted Physiotherapy



iSpecs [Intelligent Spectacles]



Individual Protection System with built-in sensors



BoT for Solar Panel Cleaning and Monitoring



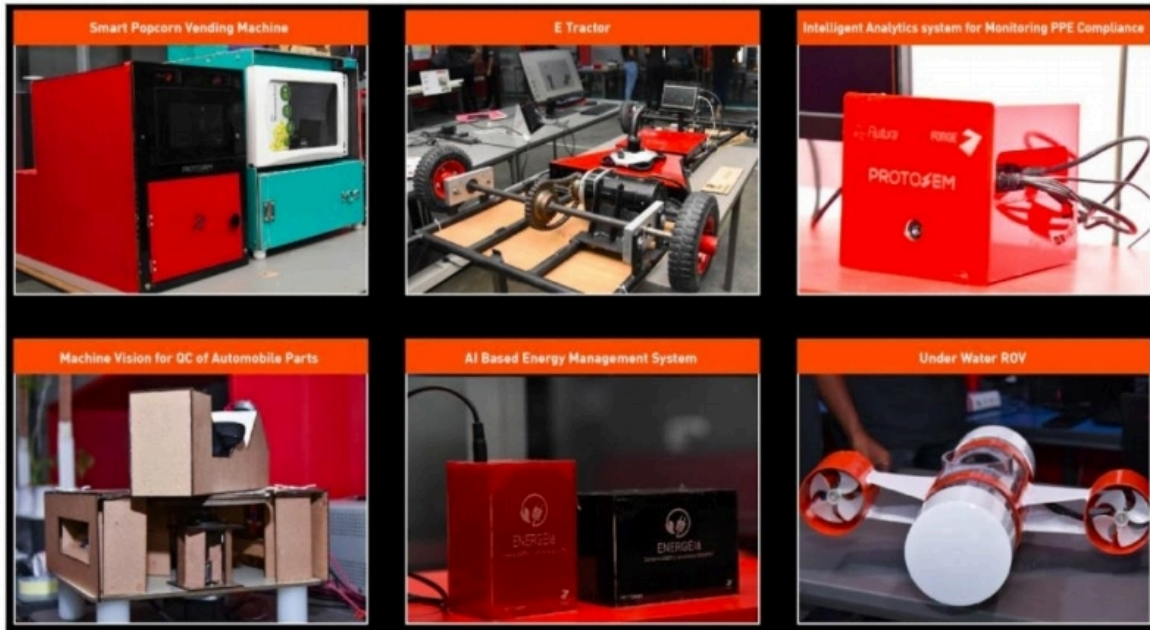
Automated Rail Monitoring for NDT Fault Detection



Battery Swapping BoT for Drones



Funded Startups/Innovations



Corporate-sponsored Innovation Fellowship

10 Innovation Engineers bagged employment at ThoughtWorks after a rigorous internship and interview. To identify potential candidates from the current Cohort, students across various academic institutions underwent Innovation Bootcamp. During the Boot Camp various workshops, organized to upskill and competencies required for selection were supported by the ThoughtWorks.

Based on expert suggestions, selected students underwent rigorous training on specific skills and competency development on the best practices and processes. It was practised under the mentorship of experts and developers. ThoughtWorks acquires potential interns/employees based on their exceptional performance during their internship.



Innovation Engineers placed at ThoughtWorks through Fellowship

Differential Employability

With network of start-ups and industrial connections spanning across different sectors, ProtoSem provides visibility and access to employability opportunities. This network shares technology discussions, events notifications and others in the context of engineering and product.

6. Problems Encountered and Resources Required.

- Most of the courses are handled by industry professionals where session planning is important
- Requirements of Program Interns is mandatory in order to support the teams for their product innovations
- High end hardware labs and work tables required for MUP development
- During pandemic, *ProtoSem* Experience Kit was developed to learn, play and execute their learning outcomes



PROTOSEM
INNOVATION ENGINEERS



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