FAB-LAB for Innovations and Product Development

. Objectives

The Fab-Lab is to empower students to create smart devices and technology enabled products of mass production.

The Fab-Lab is a platform for students to innovate existing practices and provide stimulus for local entrepreneurship culture.

The Fab-Lab provides opportunity for the students to play, mentor, try and create new smart devices

The Fab-Lab facility enables the students to build a network of distributed labs for research and innovation.

. The Context

SNGCE Fab-Lab is a technical prototyping platform for innovation and inventions and also acts as a facility for providing stimulus for local entrepreneurship. The Fab-Lab is means to connect to global community of learners, educators and technologists, researchers, makers and innovators. The SNGCE fab-Lab provides the students to share their knowledge and skills through a net work of several countries and time zones.

SNGCE fab-lab is a collaborative initiative of Kerala Start-up Mission at total cost of Rs.40lahs In Kerala there are only very few self financing engineering colleges having this unique facility for the students to explore and develop their ideas into new socially relevant devices.

The SNGCE Fab-Lab has the following latest equipments for students to tinker with and try their ideas.

1. ShopBot (Desktop CNC machine)

2. Epilog Laser Cutter.

3. 3-D printer.

4. Vinyl Cutter.

5. Electronic Section.

6. Moulding and Casting section

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These equipments are mostly imported and is a package for all the institution having Fab-Lab

It is unique facility for students and faculty members to develop new devices

. The Practice.

The Fab-Lab in SNGCE is being used effectively   by both teachers and students to try their new ideas for developing several smart devices . It is also worth mentioning that all the students of different engineering department of the college are being given opportunity to use this facility under the guidance of the teachers,.Further access to this unique facility is given even to   local youth who wants to try and explore their new ideas. The faculty member in charge of the Fab-Lab gives detailed explanation and also demonstrates theworking of all the equipment in the Fab-Lab so that interested students can use the facility free of cost. This freedom provides amble scope for the students even tryall their ideas even if it turns out to be silly.

There have been several initiatives by students and faculty members. And good number of such initiatives finally led to development of new devices. SNGCE is really proud of such initiates as some of the devices developed by the students under the guidance of teachers have been presented in state level and university level exhibitions and won appreciation and prizes. For the purpose of illustration, we present the details of two such devices developed by students under the guidance of faculty members.

. Evidence of Success

Self stabilizing Spoon.

This project was done by a group of three students from electronic and communication engineering department under the guidance of a teacher. The idea of developing a self stabilizing spoon was conceived the student seeing the difficulties being faced by persons wit who are functionally challenged. The self-stabilizinf spoon developed by the group is to assist the people suffering from Parkinson's disease. Parkinson's disease is a brain disorder that leads to shaking, stiffness, and difficulty with walking, taking and holding an object, and difficulty in eating. The self-stabilizing spoon developed by the students using Fab-Lab facility assists/ helps the people suffering from parking's disease to eat food independently. The self-stabilizing spoon maintains a horizontal position of its front end regardless of the motion it receives from the user at the rear end and the spoon thus enable s the PD person to best by himself.

Multi Purpose Intelligent Canister.

Multi Purpose canister is an intelligent container designed to track the amount of commodity inside it and alert the user when the quantity depletes below a particular level. It can recognize
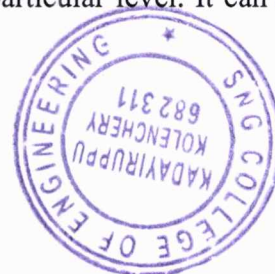
voice commands and has many other smart features integrated into it. This canister can be used in hospitals, laboratories and industries. The canister is an IOT based device which can be easily connected to the smart phones.

The multipurpose canister is a smart container which is capable of tracking the expiry date and the exact amount of commodity in it. It is a technological marvel that will make the traditional canister obsolete.

The fab-Lab in SNGCE is a unique resource whish acts a facility for students to develop new ideas and create newdevices and products. All the departments in SNGCE use this facility to demonstrate the latest developments intechnology to the students.

Problems Faced and resources required.

One of the problems faced by the Fab-Lab is that few faculty members who have been trained in the operation and maintenance of the equipment in the lab quit the job during the pandemic and SNGCE had to identify talented faculty members in their place. The self stabilizing spoon could not respond to some of the vibration effectively due to the servo motor capacity. Hence we had to change the servo motor with higher capacity to achieve the desired performance', initially the students had certain hesitation to use the equipment in the Fab-lab Due lack of familiarity .Subsequently we could overcome thei issue by time motivation and engorgement.

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Institution has created an ecosystem for innovations and has initiatives for the creation and transfer of knowledge like patents filed, published, incubation centre facilities in the HEI, etc

Response:

Innovative cultural practices in SNGCE can include a range of initiatives that foster a culture of innovation, creativity, and learning among the students and faculty. The Institution's Office of Research Integrity (ORI) and Innovation Council (IIC) program in collaboration with AICTE for SNGCE systematically fosters the culture of innovation and start-up ecosystem across education. A few of them are:

1. **The Innovation Council (IIC) program**, to foster innovation and entrepreneurship among students in SNGCE. The program aims to create a culture of innovation and provide a platform for students to develop their entrepreneurial skills and Incubation Support, Fostering Industry-Academia Collaboration, Encouraging Funding and Intellectual Property Rights (IPR) Policies and Promoting Societal Development by Creating a Network of Innovators.

2. **Entrepreneurship Incubation Programs:** Offers entrepreneurship development programs through IEDC and G-TBI for the skills and knowledge required to start their own businesses.

3. **Hackathons and Innovation Challenges:** Conducted hackathons and innovation challenges could have provided a platform for students to showcase their creativity and problem-solving skills.

4. **Conferences, Workshops and Seminars:** These provide an excellent opportunity to meet and interact with peers from different institutions and countries in fostering innovation and research in various fields.

5. **Publications:** This inspires new research projects, collaborations, and innovations, leading to further advancements in the field.

6. **Design Thinking:** Design thinking approach that emphasizes empathy, experimentation, and iteration to introduce students to this approach and help them develop their design thinking skills.

7. **Tech-Fests [Fugeniz]:** Facilitate knowledge-sharing, collaboration, and networking among participants, which can lead to new research projects and partnerships.

8. **Virtual/ICT Learning Environments**: The use of ICT, such as online courses, webinars, and virtual labs, provides students with access to a wider range of learning resources and enables them to learn at their own pace and convenience.

9. **Industry-Academia Collaboration:** Collaboration like MoUs/ MoAs with industry partners has provided students with exposure to real-world challenges and opportunities to work on live projects.

10. **Centre for Advanced Studies and Training:** CAST Offering interdisciplinary courses provides students with a broader perspective on an advanced level and exposes them to different disciplines and their applications.

11. **Research and Innovation Centres:** Nine Centres for Innovations and Research (CIRs) can provide a platform for students and faculty to engage in cutting-edge research and innovation.

ORI in association with CIRs led by Departmental Innovation and Research Committee (DIRC) will function closely with IIC for the smooth running of Innovation and Research in all programmes to prepare researchers and students for the challenges of the modern workforce.

1. **Research Funding:** Motivates to find Funding from a variety of sources, such as government agencies, industry partners, and non-profit organizations.

2. **Research Ethics Training:** Research ethics training is a critical practice and how to apply them in their work. This training typically covers topics such as informed consent, confidentiality, and conflicts of interest.

3. **Professional Gurukulam Publications:** Publication assistance to publish books, academic journals, conferences, and other venues.

4. **Research Infrastructure:** Research infrastructure such as FAB laboratory equipment, software, and computing resources.

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