PRODUCT INNOVATION CENTRE

The Product Innovation Centre (PIC) is a unique initiative of Bannari Amman Institute of Technology to promote innovation and entrepreneurship among students. The PIC is a platform for students to develop innovative products and solutions to real-world problems. The PIC is equipped with state-of-the-art facilities and tools to support students in their product development journey. The PIC is a hub for multidisciplinary projects that involve students from various departments. The PIC is a place where students can collaborate, innovate, and create products that have a positive impact on society. The PIC is a testament to BIT's commitment to fostering a culture of innovation and entrepreneurship among students.

### **Manufacturing & Fabrication Cell**

### **VISION**

* Manufacturing and Fabrication lab of Bannari Amman Institution has been established with the ultimate aim to facilitate and support the learners in the month of Jul. By enhancing interpersonal and technical skills in designing and manufacturing vehicles, the learners can contribute to product developments in interdisciplinary laboratories by incorporating machining techniques. The learner as an Engineer will be able to provide solutions and inventions based on societal needs abiding by all the standards and ethics.

### **MISSION** The fundamental objective is to kindle and evacuate all the inhibited talents of the learner and project him as an equipped engineer in the midst of existing industries/ entrepreneurs.

* Encourage the learners to participate in all National and International technical events and showcase their skills. The learner will be able to organize the same platform and improve their interpersonal skills.
* We are here to ultimately facilitate the needs and support the learners to assure they yearn to gain knowledge in their respective domains.

### **WHAT WE DO**

* Design and stimulation (sketch any kind of 3D, 2D sketches, Sheetmetal composites tooling parts and their assembly using Catia).
* Material processing and Handling (Engineering standards and specification).
* Automation (Selection of suitable actuators, Drive, and guideways based on application).

### **Robotics & Automation**

### **Vision**

* To create innovative products through a pool of research and industry collaboration activities and develop the technical resource to improvise the student’s skills sets in the field of Robotics, Vision System and Artificial Intelligence

### **Mission**

* To research and develop the advanced products in the field of robotics and automation.
* To enhance domain specific knowledge through Industry tie-up activities to bridge the gap between industries and institutes.
* To enhance students’ cognitive skills by inculcating the research knowledge on Robotics, Machine Vision System and Artificial Intelligence.

### **What we do**

To create industrial robots, mobile robots and autonomous vehicles integrated with advanced technologies like vision systems and Artificial Intelligence to enhance the efficiency, productions and safety features.

AI Based Industrial Automation

### **Vision**

* To create automation based innovative products through pool of skilled resources to meet present and future needs of industries and societies in various AI, Robotics and Automation sectors and fields.

### **Mission**

* To enhance students’ skills by affording training on AI in automation and robotics.
* To develop domain specific knowledge through Industry tie-up activities to bridge gap between industries and institute.
* To carry out advanced research activity in the field of robotics and automation that serves the future demands.
* To carry out advanced research activity in the field of robotics and automation that serves the future demands.

### **What we do**

AI Based Industrial Automation laboratory of Bannari Amman Institution has been established in the month of July 2018. We ideate, design, manufacture and install custom built Industry 4.0 enabled factory automation, Robotic System with AI capabilities services and products based on customer’s entailment. We dedicate ourselves to providing you with integration of AI in Mobile and Industrial Robotic system, Vision System, PLC, VFD, Servo, vision system, IIoT solutions using Raspberry Pi, ESP8266, LoraWAN, Jetson Nano and ROS. We are encouraging our students to participate in International and National level events. We are deeply engaged in providing a pleasant platform for students to enrich their knowledge in the field of Industrial Automation and pioneering the students to file a patent for their own ideas. The short glimpse of our past products to the prominent industry concern are IoT based industry lighting monitoring system, Automatic Antibiotic Disc Dispenser system, valve Time response analyzer etc, AC monitoring system, G-One saver, Swarm Robots, AMR. We have developed an analyzing system which test the pneumatic valve and gives you the standard time response of valve’s actuation.

### **Contact**

Email: [officespeciallabs@bitsathy.ac.in](mailto:officespeciallabs@bitsathy.ac.in)

### **Hackathon**

### **Vision**

* To encourage and motivate the students to participate in various Hackathon and product design contests that improve their technical skills and calibre.

### **Mission**

* To create awareness, motivate and guide students to participate in national and international level hackathon.
* To train the students for software and hardware hackathon by conducting intra-college hardware hackathon.
* To support financially in creation of innovative projects and products.
* To motivate and guide the students to apply for funding and to work collaboratively with industries to transform engineers into entrepreneurs.

### **What we do**

* Optimize the solution for problem statement.
* Help the students to achieve the objective of the solution.
* Provide the hardware and software platform support to achieve the objective.
* Assist the students to publish their work in the journal.
* Help the students to transform projects into products by filing the patent.

### **Aquatech Innovation**

### **Vision**

* To provide cutting-edge autonomous underwater robotics solutions that drive innovation in ocean exploration, environmental monitoring, and underwater operations, fostering enhanced sustainability in complex underwater environments.

### **Mission**

* To promote underwater robotics as a key educational interest and a future-focused research sector, fostering innovation and collaboration for the advancement of marine technology.
* To develop autonomous and remotely operated robots capable of performing underwater surveillance, detecting and locating objects, and executing precise tasks, pushing the boundaries of marine exploration and operations.
* To provide a platform for innovative ideas and cutting-edge research in marine technology, encouraging the development of collaborations, publications, and technological advancements in the field of underwater robotics.

### **What we do**

AquaTech Innovation (ATI) Lab (formerly Unmanned Underwater Vehicle Lab) at Bannari Amman Institute of Technology (BIT), established in 2018, is at the forefront of advancing underwater robotics by integrating cutting-edge technologies such as Machine Learning (ML), Deep Learning (DL), and advanced control and PCB design. Our mission is to design and develop autonomous and remotely controlled underwater vehicles capable of performing a wide range of complex tasks in underwater environments. The lab serves as an interdisciplinary platform where students from diverse domains come together to innovate, collaborate, and apply their knowledge to address real-world challenges. Through participation in national and international competitions, ATI Lab empowers students to develop advanced technological solutions, contributing to the future of marine exploration, environmental monitoring, and underwater operations.

### **Contact**

atilab@bitsathy.ac.in

### **Lab In-charge**

Prof. V. Baranidharan

### **Sensors and Tamil Computing**

### **Vision**

* To design and develop AI systems for various applications through inter-disciplinary research.
* Identify, formulate and solve industry-defined real-world problems in various fields of Engineering including Agriculture, Food Technology and Dairy Technology.
* To develop AI and VR systems for Tamil Music, Tamil Language and Tamil Culture.

### **Mission**

To encourage students to participate in academic and industrial research and thereby facilitate internships in reputed universities and research institutes at national and international level.

### **What we do**

* Design and develop AI systems for a wide variety of applications.
* Create products based on AI systems and sensors developed, thereby cultivate engineering skills among students.
* Develop AI and VR systems for Tamil Music, Tamil Language and Tamil Culture.

### **Printed Circuit Board**

### **Vision**

* Printed Circuit Board (PCB) Laboratory focuses on complete electronic system design and prototyping.
* Our primary objective is to support the students, faculty, and researchers to convert their ideas into Electrical/Electronic Circuits, Prototypes, and then to Products.
* Motivate the students to participate in National and International level competitions.
* This lab aims to develop an in-house electronic product to accomplish the “Make In India” initiative.

### **Mission**

* To impart the knowledge required for recent and advanced PCB Design and Manufacturing processes.
* To empower the students with state-of-art technology to meet the growing challenges of the industry.
* To encourage the students to participate in various technical national and international contests.
* To enable the students to take up the real-time industry as well as interdisciplinary projects.
* To develop a modern and efficient laboratory infrastructure.

### **What we do**

* PCB Design Single and Double Layer.
* PCB Prototyping Single Layer.
* Embedded System Design and Prototyping.
* VLSI Design and Simulation.
* Machine Learning Algorithm Implementation for Image and Signal Processing Applications.
* Autonomous Micromouse/Microbot Design and Implementation.
* Antenna Prototyping.
* PCB Assembling & Soldering.

### **Embedded Technology**

### **Vision**

* To design and develop embedded system products for various applications through inter-disciplinary research.
* To identify, analyze and provide solutions to the day-today life problems by means of technology.
* To build customized embedded hardware for real time applications.

### **Mission**

* To motivate students involving in research works to participate in national and international level competitions related to their work and competencies.
* To analyze real world problems and acquire knowledge in latest trends in technology through industry relationship.

### **What we do**

* We design and develop embedded system product for various application through inter disciplinary research, to provide solutions to day today life problems by means of technology.
* Training Students in various development boards and its associated software.
* Focusing on the students participation in various technical competitions in National and International levels.
* To approach industries for the collaboration to work on industry related problems as Consultancy project.

### **IOT**

### **Vision**

To renovate things into smarter, by keeping them lively with internet and endow with artificial intelligence based elucidation to the general public from the analytics done from the virtual location.

### **Mission**

* To afford the platform where professionals become skilled at smart city applications.
* To meet up the quality of engineers’ requisite to erect an Industry 5.0.
* To make available of expertise Centre for skill up-gradation.

### **What we do**

* Our primary objective is to support the students to do research on IoT and develop their own products in the domain of Electronics and Computer Science. The students were given a platform to develop the application products, which is to be used in Smart City applications. This lab motivates the students to participate in national and international level events as well.  
  We concentrate on the following verticals:
* Sensors
* Cloud
* Controllers

The Internet of Things Laboratory in Bannari Amman Institution has been established during the month of October 2018. For students, the lab is a one stop solution for Industry-on-demand skills. The facilities around the lab make student’s future ready to deal with the requirements of the industry. Apart from getting hands on learning and development experience, the student develops interpersonal skills as well. The lab environment gives an experience of Project Management, Project Documentation and Leadership Skills.  
The lab provides immense Research Opportunities for the Professors and PG/Ph.D scholars. Having a lab at the campus makes it easy to receive Project Grants as it will justify the sustainable use of the grants. This also opens the scope for Faculty Consultancy Opportunity.  
In the lab, IoT devices can provide instant or long-term analysis, unlike anything we’ve ever experienced. It will likely transform how we conduct research, process development and manufacturing.  
Focus on research-design and development of IoT enabled technologies & solutions which are cost effective and socially relevant.  
IoT Labs will inspire students to create new products and services and look at providing solutions to problems from a creative mind-set. Our innovation labs intend to provide an enriching experience to students so that they can break away from the monotony to come up with novel ideas with leadership skills.  
In the long run, it will help create start-up founders and entrepreneurs.

### **Electrical Drives**

### **Vision**

To excel in the field of Industrial Drives by developing industrial based product design and providing technical solutions for the real world problems and provide a continuous learning environment

### **Mission**

* To equip students with the skills to operate the industrial drives.
* To design and develop electric drives for various applications.
* To collaborate with the industries and institutes on developing solutions for problem statements in the field of Electrical Drives.

### **What we do**

We provide continuous training to the students in the field of Industrial Drives and Automation using Siemens Industrial drives and create opportunities to excel and showcase their ideas in the national and international level contests, hackathons. We promote research in the field of advanced industrial drive applications using PLC and VFD Drives by providing a continuous learning platform. We develop PC/FPGA-based real-time simulators using OPAL-RT for the Hardware-in-the-Loop (HIL) testing equipment and Rapid Control Prototyping (RCP) systems to design, test and optimize control and protection systems used in power grids, power electronics, motor drives and various industries.

### **Artificial Intelligence**

### **Vision**

* To create a dynamic hub where students can explore cutting-edge AI technologies and develop innovative solutions to real-world challenges.
* To empower students with hands-on experience in AI research, enabling them to make meaningful contributions to the field and prepare for successful careers in academia and industry.

### **Mission**

* Apply AI techniques to solve real-world problems across various domains such as healthcare, finance, transportation, and more, enhancing efficiency and effectiveness.
* Encourage innovation and creativity in AI, supporting students in developing novel solutions and exploring new applications of AI technologies.
* Provide practical experience through projects, internships, and collaborations with industry partners, allowing students to apply AI techniques to real-world problems.

### **What we do**

* Field of research: Our lab is committed to conducting research that addresses real- world challenges and contributes to positive societal impact in the areas of Machine learning, Deep learning, Edge computing and Generative AI.
* Research focus: Our lab seeks to develop state-of-the-art Deep learning, Computer vision and NLP models capable of performing image recognition, image classification, understanding and generating human-like language. We focus on tasks such as sentiment analysis, machine translation, prediction, AI powered surveillance, Object detection, Face recognition and image generation with an emphasis on robustness and interpretability.

### **Data Science**

### **Vision**

Contribute to the progress of Data Science research through appropriate use and diffusion of emerging technologies.

### **Mission**

* To promote research related to Data Science.
* To motivate students to enhance knowledge in Data Science in order to develop projects and products.
* To develop proof of concepts for industrial problems and to solve complex problems for participating National/International Competitions.

### **What we do**

* We are working in the fields of Data Analytics, Design of Algorithms, Big Data Analytics, Visualization models, Building Reusable Methods (Github/ Kaggle Utility Scripts) to develop innovative data analytics projects and to fulfil the requirement of customer through consultancy services.
* To provide continuous training to the students in the field of Data Analytics with Business perspective and provide platform to showcase their ideas in the National and International competitions.
* To promote the research in the field of advancements in Machine Learning, Deep Learning and Big Data Analytics with additional insights to business analytics.

### **Full Stack & Devops**

### **Vision**

To revolutionize the Full Stack and DevOps landscape through innovative product development, empowering individuals and businesses with transformative solutions that enhance efficiency, connectivity, and overall user experience.

### **Mission**

* Through continuous research, collaboration, and user-centric design, we aim to deliver cutting-edge Full Stack and DevOps solutions that address real-world challenges.
* Our expertise spans web applications, mobile applications, and industrial automation, enhancing productivity and inspiring positive change.
* With a commitment to quality, agility, and ethical practices, we aim to empower individuals, businesses, and communities to thrive in the digital era.

### **What we do**

The Full Stack & DevOps lab drives innovation across software development and operations, specializing in both front-end and back-end technologies, as well as deployment and automation. It bridges academia and industry by collaborating on projects, offering consulting services, and creating digital solutions for community challenges.

### **Cloud & Cyber Security**

### **Vision**

* The key objective of the CLOUDS Lab is to develop fundamental, next-generation cloud and Storage technologies that support a true utility-driven service-oriented computing.
* We built a strong and intra disciplinary team to discover future cybersecurity issues and challenges faced by individuals, organizations and governments.

### **Mission**

* Develop indigenous cloud solutions to stay ahead in the field of information technology.
* Deliver training to students and faculties to improve their IT solution development skills.
* Secure consultancy services by reaching out to the public.
* he cybersecurity lab addresses and bridges the gap between academics and industry in cybersecurity standards, issues and privacy. The cell engages both private and public sector on cybersecurity issues and resolves them into deployable technologies.

### **What we do**

* Computing Resource Management Techniques.
* Storage Management Techniques.
* To make them do innovative projects in the Blockchain Technology.
* Further, they convert the projects into marketable products.
* Private Cloud Implementation.
* Educate and train future engineers as future cybersecurity professionals.
* To dig into technical security issues and analyze them in 360 degrees.
* Identifying common web vulnerabilities and practising contemporary standards and policies in cybersecurity and privacy.

### **XR Studio**

### **Vision**

* To building cutting-edge experiences from concept to deployment in the AR/VR platform.
* The vision for the Augmented and Virtual Reality lab will Contribute to the creation of new AR/VR applications, which will enhance the well-being of individuals worldwide.

### **Mission**

* To promote advanced research and education on Augmented and Virtual reality by organizing training/workshops for students and research scholars for skill up-gradation.
* To create immersive solutions with a positive impact, by going the extra mile, focusing on team synergy and deep tech expertise.

### **What we do**

* Our objective is to provide immersive training to the students in the field of Augmented Reality, Virtual Reality, Game Development and provide a platform to showcase their visions in the national and international competitions.
* We are promoting research in the field of Game Development, Virtual/ Augmented Reality applications and Animations by providing a continuous learning environment.

### **Blockchain Technology**

### **Vision**

The BlockChain Special Laboratory at Bannari Amman Institute of Technology intends to create international leaders in researching, developing, and disseminating technical solutions and policies about cyber security and privacy. The vision of the BCT laboratory is to make India as a cyber secure country in the world.

### **Mission**

* To conduct basic and applied research in the area of Cyber Systems and Information Assurance.
* To collaborate with industry, government and academia on both the theory and practice of information assurance and cyber security.
* To train professionals, students and government officials to adapt the modern cyber security practices.

### **What we do**

* As Blockchain technology is going to be future, we are urged to update ourself into this technology.
* So, we have planned to expertise the students in the field of Blockchain Technology by making them write quality technical papers to present in the reputed conferences and get published in the highly impacted journals.
* To make them do innovative projects in the Blockchain Technology Further, they convert the projects into marketable products.
* To signing MOU with reputed Industries.
* To get engage with consultancy projects and engage students with stiffened internships.
* To get the BCT students placed in a highly paid Blockchain based firms.

### **Bioproduct Innovation Cell**

### **Vision**

* The lab aims at developing critical technology using bacteria, fungi and algae for enzymatic processes towards development of neutra-ceuticals, phyto-chemicals, value-added bio-products for various applications in Food, Paper, Detergent, animal feeding and Textile.
* To develop and characterize functional biomaterials (nanofibers, hydrogels, films, scaffolds, adsorbents, nano composites etc.,) from natural biopolymers for medicinal and healthcare applications.

### **Mission**

* Our key objective is to stimulate the students to manifest their ideas into innovative products and process development by enhancing the basic and applied research on bio-process, bio-materials and molecular diagnostics and microbial characterization.
* We are keenly interested in upgrading the basic research facility to advanced level through fund generation from Government agencies and industries.
* Also, we are involved in organizing training/workshops for students and research scholars for skill up-gradation.
* We are intensely engaged in activities such as Quality testing of food and water samples for microbiological parameters as per the Indian Standard.
* Our prime responsibility is to enhance research credentials of students and research scholars through quality publications and filing patents.

### **What we do**

* Field of research:
* The Biomaterials and Tissue Regeneration Lab concentrates on drug delivery, tissue graft engineering, organ-on-a-chip devices, therapeutic angiogenesis, and regenerative medicine. Smart biomaterials and nanomaterials are synthesized, crafting innovative biopolymer-based smart materials for biomedical use. Furthermore, we are involved in the production and characterization of biomaterials, as well as research into biopolymers.
* Research focus:

Our major research areas and projects focus on the development of Transdermal patches for Diabetic foot ulcers, Drug loaded bio-sutures that can be used in medical applications, Ocular lenses for diabetic retinopathy, Injectable hydrogels for arthritis, Implantable scaffolds in brain hematoma. Our team is also working on Intelligent packaging material – bioplastic, Smart material – Filters for the removal of industrial dyes and purification of sewage water, Bioleathers, and Fireproof and bulletproof materials. We intend to incorporate a multidisciplinary approach to solve real-time societal problems.

### **Smart Agriculture**

### **Vision**

To discover, share, and disseminate knowledge of integrated agricultural and environmental systems to students, the agricultural community, and society.

### **Mission**

* To provide an amicable environment for students to develop innovative technologies for agriculture and allied sectors.
* To develop skills on the various aspects of agricultural engineering to make graduates blossom into entrepreneurs, scientists, academicians and technologists for sustainable food production.

### **What we do**

* Field of research:
* Automated Irrigation System, Agricultural Machinery and Post- harvest processing.
* Research focus: Currently we are focusing on the following themes.
* Multi-crop Vegetable transplanter: This implement helps transplanting various varieties of vegetables in Indian soil.
* Study on Green Gram for Sathyamangalam farmers: This study is mainly intended to help farmers in Sathyamangalam region grow dry crops and increase productivity thereby increasing their income.
* Multi-Crop Hydroponics: The main aim of this setup is to cultivate the non- seasonal crops without soil media.
* Soil and Water Quality Tester: The main aim of this product this water quality range optimize and suitable for soil crop specific yield using bio fertilizer.

### **Food**

### **Vision**

To equip the students about the conceptual facts involved in the advancements of the food matrix to meet the needs of the emerging growth in food processing and preservation segments using the potentials of biomaterials.

### **Mission**

* Educating students community with technical skills and the importance of sustainable development projects in the society and the industry.
* Facilitating practical training in the module of wide spectrum associated with product development and market research, which helps to balance their confidence in entrepreneurship program.
* Incorporating the advancement of research finding in food product and process development to meet the needs of industry and society under eco-friendly concepts.

### **What we do**

The Next Generation Food Laboratory of Bannari Amman Institute of Technology was established in the month of October, 2022. The special research lab on Next Generation Foods (NGF) aims at demonstrating the potential needs of society and computing the advancement facts to frame up the thinking ability of students and providing a platform to collaborate with industrial and scientific channels. It facilitates the students to understand the basic conceptual and research gap in new product development and technology transfer of developed products with help of channel experts. Furthermore, the lab also focused on supporting hands-on sessions while conducting national/ international short-term training programs and workshops. This laboratory work focuses on developing the healthy food matrix to meet nutrient needs at affordable cost. There are several products in the market with very high nutritional value which are not affordable. Here we made an attempt to develop a matrix which suits multiple environments under economic consideration.

### **Machine Building**

### **Vision**

To develop products through integration of smart manufacturing technologies & automation and enhance the skill sets of low cost automation and design for additive manufacturing.

### **Mission**

* To develop low cost automation solutions to meet the demands of the industries.
* To enhance the knowledge and skill in the field of additive manufacturing through.
* industry institute collaboration.
* To empower the manufacturing workforce through continuous education, training, and skill development, while fostering strong collaborations with industry partners, academic institutions, and government agencies to advance research and innovation.

### **What we do**

* We Approaching industries for collaboration on solving industry-related problems as consultancy projects.
* We working on metal additive manufacturing to make it a transformative technology for various industries.
* We developing a product for assessing skill sets involves several key steps, from identifying the target to creating effective assessment tools

### **Gurugulam**

ABOUT GURUGULAM

The benchmarking initiative of BIT Gurugulam was established from the year 2021. The Gurugulam provides students with hands-on experience in foundation skills under faculty supervision. Through the program, students will get acquainted with professional and technical skills. This program has paved the way for students to learn by discovering, enabling high levels of student-faculty interaction and thus expanding the level of research activity on campus. It also helps to identify and train potential candidates for the industrial-ready material. The faculty members' meticulous plan execution is based on industrial standards comparable to World Skills. Toyota Kirloskar Motor and Lincoln Electric designed the Framework and Standard Operating Procedures for BIT Gurugulam.

### **Foundation Skills**

### **Welding**

### **About the Skill**

BIT Welding Gurugulam is a lab dedicated to promote “Skill Excellence in Welding” for both academia and industry. This was established with an estimated cost of Rs. 1.78 crores. It is possible to narrow the gap between industry expectations and technical education by using this skill, which will enhance both the technical institutions’ alignment with market demands and the employability of engineering graduate students. In this facility, there are cutting-edge laser and plasma devices as well as highly advanced welding equipment. This competency will help our students gain a thorough understanding of both fundamental and cutting-edge welding technology, including all significant welding processes. Additionally, students will discover how to function effectively in groups and ways to assist others in understanding key aspects of welding processes. In addition to participating actively in welding technology and fabrication, students will develop a speciality in areas such as assembly design, material weldability, welding procedure specification and execution, and welding process selection and implementation.

### **Outcomes**

* Fabricate steel structure – Twisted Chair
* Fabricate steel structure – Modern Gate
* Truss Fabrication
* Fabricate steel structure – Creative Table [MIG Welding]

### **Prototype Modelling**

### **About the Skill**

The prototype modelling Laboratory was established in 2021 at BIT Gurugulam, with a cost estimate of Rs. 1.5 crores. It provides students with an overview of design for projects, as well as opportunities in creative product design and community service. The science of product-making starts with ideation. Students develop ideas for product development and work in teams. Students enhance creativity and experience fundamental aspects of the product development process, including determining customer needs, brainstorming, estimation, sketching and modeling, concept development, design aesthetics, detailed design, and prototyping. As students work on their products, they are also tasked with finding a creative way to present their developed products. They perform skits to introduce their designs to their peers. These skits help hone communication skills that will be instrumental as their academic career progresses. One of our main goals with this skill training is to get students excited about engineering. The hands-on, physical experiences in the training have helped to understand the theory much better.

### **Outcomes**

* Prototype modeling skill and CAD.
* Understand and convert a given model into a prototype using various tools and types of machinery provided.
* Prepare CAD model and technical drawing.
* Prototype making and painting.

### **Assembly and Dismantling**

### **About the Skill**

Assembly and Dismantling is an interdisciplinary and essential life skill training initiative focused on gaining tool knowledge and practical understanding. This initiative offers students competency in dismantling and assembling home appliances and vehicles that are used in day-to-day life. It also bridges the gap between industry requirements and technical education, thereby providing solutions that make technical institutes more aligned with industry needs and make engineering graduate students industry-ready.

This skill imparts students with the methods of assembly and dismantling, as well as tool handling techniques, geared towards rectifying equipment faults. Depending on how they are used, assembled components might have a variety of distinct interactions.

### **Outcomes**

* Dismantle and Assembling Home Appliances (Gas stove, Wet Grinder and Mixer grinder).
* Troubleshoot HVAC equipment (Ceiling Fan & Air Conditioner).
* Dismantle and Assemble Computer Hardware with OS installation.
* Fit and Thread Household Plumbing work.
* Dismantle and Assemble Automotive Wheels.
* Dismantle and Assemble Bicycle.
* Dismantle and Assemble Home Appliances (Washing machine and Refrigerator).
* Dismantle and Assemble a Multi-cylinder Engine (Petrol and Diesel)

### **Programmable Logic Controller**

### **About the Skill**

PLC Gurugulam, which was established with a cost estimation of Rs.1 crore, is an interdisciplinary, industry-backed centre focused on developing “Skill Excellence in PLC” for academia and industry. This lab intends to bridge the gap between industry requirements and technical education, provide solutions that align technical institutes more with industry needs, and make engineering graduate students industry-ready. This lab comprises highly advanced industrial standard controllers like PLC (S71200/S7300/S71500) and HMI to learn, design, communicate, and interface advanced controllers with real-time applications. This centre assists our students and faculty members in learning ways to configure and programme PLCs from various manufacturers such as Siemens, Delta, AB, and Mitsubishi. Also, it develops applications for controlling various industry operations such as servo and VFD. This allows them to be trained both theoretically and practically in accordance with standards, thereby expanding their knowledge of Industrial Automation.

### **Outcomes**

* Design of safety circuits for pressing machine using relay.
* Implement Toll gate boom barrier system with PLC.
* Automate the Pneumatic Drilling process with Siemens S7 PLC.
* Automate bi-directional control of conveyor.
* Conveyor positioning for multiple automated station in FMS.

### **Electrical Wiring**

### **About the Skill**

Residential, commercial, agricultural, and industrial projects require electrical wiring. In electrical wiring skills, the notion of electrical wiring as per the global skill standard is demonstrated. In their assigned 8’ x 10′ x 10′ wooden cabin, the students will install the layout they have designed using AUTOCAD software. For the electrical installation process, they are provided with tools like drilling machines, spirit levels, screwdrivers, measuring tapes, and curtain spring wires. The students will gain practical experience with electrical wiring. Following the fitting of all the components necessary for the electrical connection, the students are expected to install the electrical appliances in their cabin for a properly wired layout. The knowledge comprises electrical wiring for a home, a staircase, a UPS, and three-phase wiring.

The students will learn the ways to utilize electrical installation tools, electrical wiring in accordance with global skill standards, and electrical safety devices like fuses, ELCBs, and MCBs as a result of the electrical wiring.

### **Outcomes**

* Develop the single phase wiring layout for the cabin using Auto CAD.
* Demonstrate surface mounted conduit system with proper junctions and PVC connections.
* Demonstrate single phase wiring for the cabin by surface mounted conduit wiring system
* Demonstrate the single-phase wiring with UPS and motor rewinding wiring scheme.

### **Electronics**

### **About the Skill**

Electronics skills are required for all engineers to design and analyse the electronic gadgets that are used on a daily basis. The engineers are expected to operate specialist equipment in the workplace that ranges from aerospace and the armed forces to the entertainment industry, robotics, health, education, and telecommunications. All this involves electronic components that play a vital role in their work. The motive of BIT Electronics Gurugulam is to enhance the student’s skills in electronics by taking up complex problems in the field, fixing things, making things, using computers and using tools to solve the problem. As an outcome, the students will learn to assemble and wire the products, test the system, and design the prototype circuits for the given statement of the problem.

### **Outcomes**

* Design a circuit using active and passive components and practice soldering.
* Implement a TSOP Controlled Robot & Line Follower Robot.
* Implement an Obstacle avoidance robot and voice-controlled robot.
* Implement a Mobile-controlled robot and follow the robot.
* Implement a Gesture controlled robot and light the following robot.

### **Network Operating Systems**

### **About the Skill**

The Networking Lab was established in 2023 as part of BIT Gurugulam for students to provide students with an opportunity to design, build, debug and manage small to complex computer networks. Each of the 30 highly configured systems includes a network and 30 switches where students configure and integrate the operations for routing and switching protocols and technologies associated with modern communication networks. Also, students learn to configure and administer the protocols, technologies and storage required to support and manage a network of users on small to enterprise-scale computing architectures.

### **Objectives**

* Impart state-of-the-art knowledge on advanced topics in Computer Networks in an interactive manner through the Web
* Introduce the concept of network simulation to the students
* Involve students in analytical studies of Computer Networks

### **Outcomes**

* Students will gain a comprehensive understanding of networking concepts, including the network topologies, and networking devices.
* Students will learn to design and configure different types of networks, including local area networks (LANs) and wide area networks (WANs)
* Students will acquire skills in diagnosing and resolving common network issues, such as connectivity problems, performance bottlenecks, and hardware failures.

### **Advanced Skills**

### **Advanced Embedded System Design**

### **About the Skill**

In the rapidly evolving landscape of modern technology, embedded systems play a crucial role in shaping our future. They are the foundation of smart devices that enhance convenience in our daily lives and the driving force behind intricate industrial systems that optimize efficiency. However, attaining proficiency in these complex systems demands more than fundamental knowledge. That’s where the advanced embedded system design skill training comes in, our program is meticulously designed to equip individuals with cutting-edge skills essential for excelling in this dynamic field. guided by experts from the industry, our skill training explores deep into real-world complexities and their solutions. Through engaging hands-on projects, students get the opportunity to move theoretical insights into tangible innovations, effectively bridging the gap between conceptual understanding and practical application.

### **Outcomes**

* Develop a customized Embedded Hardware required for the application to comply with the standards.
* Develop a Board Support Package for the single-board computer
* Develop industrial application boards, such as Single-Board Computers (SBCs) and Programmable Logic Controllers (PLCs).

### **Servo Motion Control**

### **About the Skill**

Servo Motion Control Skill is essential to train individuals in using QT software, enabling precise automation in industries reliant on intricate motion control, such as manufacturing, robotics, and automation, fostering efficiency, innovation and proficiency in using QT widgets for software development. Through hands-on training, students will learn to design and implement motion control algorithms that enable precise and efficient control of various applications, such as plotters and pick-and-place systems, in both simulation and real-time environments. This skill will also cover the development of algorithms to generate triangular and trapezoidal trajectories for linear motion in servo-axis systems, ensuring smooth and accurate motion profiles.

### **Outcomes**

* Develop motion control for plotter, pick and place application in simulation as well as real-time
* Generate triangular and trapezoidal trajectory for linear motion of the servo axis system
* Program MOVL and MOVC instruction using triangular/trapezoidal trajectory in the C program
* Create animation for trajectory motion using QT and OpenGL

### **IT Infrastructure**

### **About the Skill**

The IT Infrastructure skill lab is well established from 2023. Faculty and students in IT Infrastructure labs conducting research in the area of wired networks and wireless networks. For UG students, we are emphasizing primarily network protocol implementation and detailed study of TCP/IP protocol stack for computer communication. This lab is also an emphasis on experimental research in communication networking, in recent years there have also been contributions to Wireless networks and network security.

### **Objectives**

* Provide a positive customer experience by providing uninterrupted access to its website and online store
* Develop and launch solutions to market with speed
* Collect data in real time to make quick decisions

### **Outcomes**

* Understand the practical approach to network communication protocol
* Understand network layers, structure/format and role of each network layer
* Able to design and implement various network applications such as data
* Understand the various Routing Protocol/Algorithms and Internetworking