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DEPARTMENT OF ELECTRONICS, TIST

SPAN – **S**kill **P**lanning and **A**cquisitio**N** Cell

The Department of Electronics has always recognized the need for upgrading the skills of students and faculty to keep up with the rapidly changing requirements of the technology industry. Various workshops have been conducted by the department keeping these technological requirements in mind. In order to **bridge** the gap between industry and academics, the department is launching **SPAN – S**kill **P**lanning and **A**cquisitio**N Cell** that will identify and plan skill development programs according to current industrial requirements. The objectives of this cell are to

(i) improve employability of students by exposing them to relevant industry standard platforms

(ii) foster in students and staff the ability to design and implement projects catering to the needs of society

(iii) facilitate students and staff to keep up with rapidly changing technologies

(iv) make learning effective and enjoyable

Inauguration of Skill Planning and Acquisition Cell SP🌉N

SPAN takes great pride in announcing that AICTE has acknowledged our efforts and funded our activities for the year 2021-22 under the ***AICTE Scheme for Promoting Interests, Creativity and Ethics among Students (SPICES).*** *We are very grateful to AICTE-SPICES and the Management of TIST for their support.*

SPAN ACTIVITIES - ODD SEMESTER (2022-2023)

S. NO.	DATE	PROGRAM	BATCH	NUMBER OF STUDENTS
1	27.9.2022 – 1.10.2022	Training and Internship at Bosch Rexroth-GPTCK Centre Of Competence in Automation Technologies	S7 RA	57
2	30.9.2022	Embedded Systems Project Based Workshop	S3 RA	17
			S3 EC	7
3	2.12.2022	Image Processing using OpenCV-Python	S5 RA	27
4	20.1.2023	Arduino and Applications in Wheeled Robots	S1 RA	18
			S1 EC	3

TRAINING AND INTERNSHIP AT BOSCH REXROTH-GPTCK CENTRE OF COMPETENCE IN AUTOMATION TECHNOLOGIES

The 5-day Training and Internship at IIPC Facility, Government Polytechnic College, Kalamassery commenced on 27th September 2022. The internship was attended by BTech S7 Robotics and Automation students of Toc H Institute of Science and Technology. The focus was on skill development in core domains of Automation Technologies - Hydraulics and Electro-Hydraulics, Pneumatic and Electro-Pneumatics, Programmable Logic Controller (PLC) and Sensors. Hands-on practical training in these technologies was provided.

Day one started with the use of capacitive, inductive, magnetic, photoelectric and ultrasonic sensors used in Industries. This was followed by hands on experience on an industrial PLC of Bosh Rexroth. The PLC model used was L2003VRC.The PLC ladder programming was done in Indra Logic. Step-by-step development of Gate Logic, Relay Logic and PLC Ladder logic for industrial applications was done. The session on Day 2 dealt with Timers, Counters and the types of Timers and Counters used in the PLC. Ladder Programming based on Timers and Counters and Functional block was also done by the students.

The next two days focused on hydraulics. Hands on experience on electrohydraulic systems used products from Bosh Rexroth - a vane pump was used to pump liquid from a tank. Students were able to design the circuit with 4/2 lever operated solenoid DCV, 4/3 solenoid operated DCV, Throttle valve, Check valve and Throttle-check valve. The focus of the last day was designing electro pneumatics with hands on training sessions on electro pneumatic systems with 3/2 valve, 5/2 valve and 5/2 pneumatically actuated valve. The sessions focused on industry standard products in the automation field and enhanced the practical skills of the participants making them industry ready.
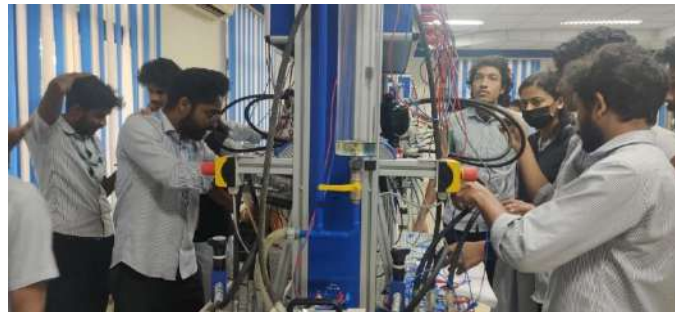
EMBEDDED SYSTEMS PROJECT BASED WORKSHOP

The field of Embedded Systems offers vast scope for employment for skilled graduates. Students learn theory and associated lab experiments within the program as specified by the university. In order to equip the participants with the skills to build a complete system starting from identification of various tasks to be performed by the system, selecting suitable processing units, sensors and actuators required, the workshop was designed around building the hardware and software of two systems using Tinkercad platform:

1. A system that measures the distance from an obstacle, measures the temperature, detects the presence of Toxic Gas and displays the result on an LCD

2. A Remote Controlled (RC) Differential Drive Robot

The final task was to integrate the two systems into one whole.

WORKSHOP ON IMAGE PROCESSING USING OpenCV-PYTHON

It is seen that there is no lab for exposing students to concepts of image acquisition, image processing and also modern tools for Computer Vision. After identifying this gap in the syllabus, in order to enhance the understanding of concepts and to enable students with skills required for doing projects in image processing, a workshop was conducted. The students were equipped with fundamental skills to enable them to continue practice independently using open-source software OPENCV-PYTHON. Concepts covered included getting started with images, videos, basic operations on images, thresholding, concepts of color, thresholding, edge detection.

ARDUINO AND APPLICATIONS IN WHEELED ROBOTS

SPAN conducted a one-day workshop to familiarize students of Semester 1, BTech Electronics and Communication Engineering and BTech Robotics and Automation, with the Arduino Microcontroller board and its applications. Students learnt to build circuits that use the analog and digital I/Os of the Arduino board. Serial communication to monitor and control applications, interfacing of sensors and actuators and decision-making structures were utilized in various applications. Speed and direction control of motors using various techniques were carried out.

The skills learnt were put to use in controlling the movement of wheeled robots as a use case.

SPAN ACTIVITIES - EVEN SEMESTER (2022-2023)

S. NO.	DATE	PROGRAM	BATCH	NUMBER OF STUDENTS
1	24.3.2023	Virtual Instrumentation using LabVIEW	S6 RA	18
			S6 ECE	9
2	27.4.2023	Virtual Instrumentation using LabVIEW	Advay 2023 Technical Workshop (RA, CSE, IT – TIST, VJCET)	16
3	15.5.2023 to 19.5.2023	Robotics and Machine Vision - Srishti Robotics	S4 RA	27
4	16.5.2023 to 20.5.2023	TCAD & Antenna Design - CUSAT	S4 ECE	20
5	29.5.2023 to 31.5.2023	Robot operations and programming –Fanuc India Pvt. Ltd.	S4 RA	15
			S6 RA	4

TRAINING AND INTERNSHIP ON ROBOTICS AND MACHINE VISION BY SRISHTI ROBOTICS

The first day started with an introduction to Computer Vision. The basics of Python programming was covered, including data types, values, and lists. The Turtle library was used to create various shapes using Python. Text-to-speech using the gTTS library and the playsound module were covered. Students learnt to capture live images and videos from a camera.

On the second day, frame setting, switching frames in Python, assigning colors to frames and frame flipping were covered. This was followed by motion detection, color vision and object tracking using machine vision. The third day began with an introduction to Robotics. Students learnt about Arduino and

its applications. Motor control was studied using the working of a simple car using two motors. This was followed by developing a simple app using the MIT app developer. The focus was on creating a Bluetooth-controlled RC car.

On day 4, students were provided with real-life examples and experiences to gain a deeper understanding of their future roles as engineers. The session then shifted to analog concepts. Students were divided into groups of three and tasked with developing a new product by adding features to an existing product within an hour. Each group had a minute to introduce their product, fostering creativity and teamwork. Day 5 started by exploring servo motors and their applications. Ultrasonic sensors and measurement of distances were also covered, along with the use of buzzers to indicate proximity. A simple RFID login system was also implemented. The session then focused on IR sensors, followed by a practical exercise in creating a line-following robot.

WORKSHOP ON VIRTUAL INSTRUMENTATION USING LabVIEW

SPAN conducted one day workshops to familiarize students with Laboratory Virtual Instrument Engineering Workbench (LabVIEW). LabVIEW is a system-design platform and development environment

for a visual programming language from National Instruments. The objective of the workshop is to enable participants to use Lab VIEW for Virtual Instrumentation. Participants learn to create VIs and use graphical programming for the acquisition, processing and display of analog and digital signals. Graphical decision making structures are used in various applications including signal processing, monitoring and control.


TCAD & ANTENNA DESIGN

The 5-day training and internship program was conducted by the Department of Electronics, CUSAT. The training program imparted hands-on practice in mastering the art of antenna design and coding exercises in TCAD. Different types of antennas, their characteristics, and design principles as well as designing antennas for specific applications such as wireless communication, satellite communication, or radar

systems were taught by the faculty and industry experts. This involved understanding the requirements, selecting appropriate antenna types, and utilizing simulation tools for design optimization. The TCAD tools are software applications used for simulating and modelling semiconductor devices and circuits. Students learnt how to set up simulations, interpret results, and make design improvements based on simulation data.

ROBOT OPERATIONS AND PROGRAMMING – FANUC INDIA PVT. LTD.

This program was conducted in association with FANUC India Pvt. Ltd. Students of BTech Robotics and Automation participated in the program to develop their skills in robot programming and to develop real industrial robotics application using FANUC's development tool 'ROBOGUIDE' The topics covered were: • Robot selection and application • Robot controllers and mechanical parts • Safety standards on robots • Different operating modes, Coordinate systems, jogging of robot • Creation, selection of program, motion instructions, control instructions • Loading and unloading application for a machine tool • Application development and simulation using ROBOGUIDE software
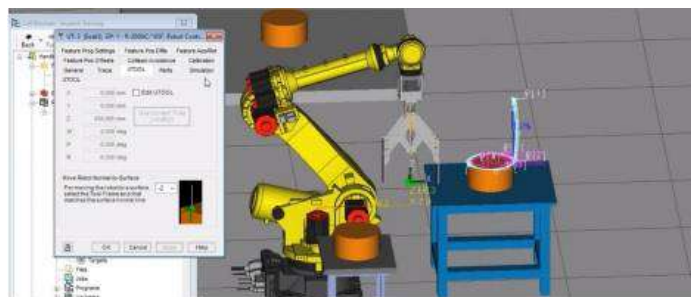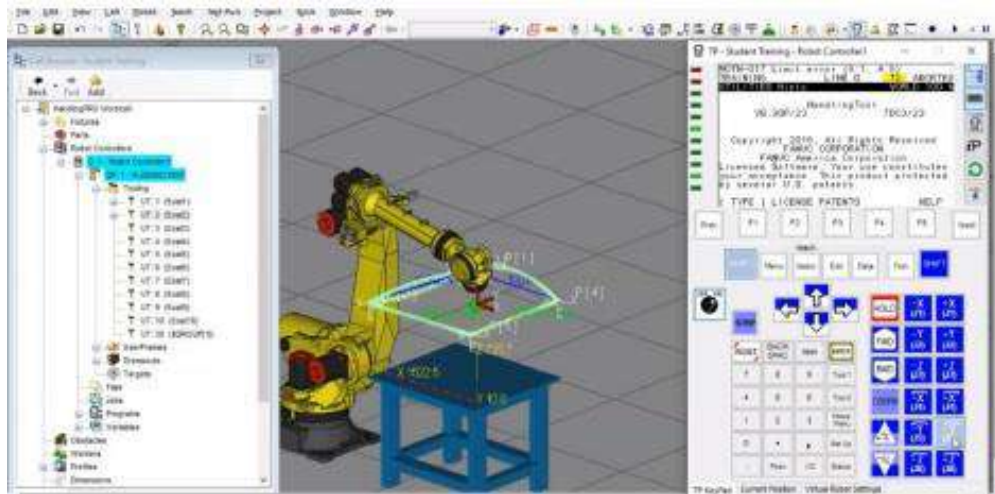
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