DEPARTMENT OF ELECTRONICS, TIST

(BTech ECE, BTech RA, MTech Wireless Technology)

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

SPAN – Skill Planning and AcquisitioN Cell continued its activities in the even semester of the academic year 2020-21 to meet its objectives. Despite the restrictions due to Covid19, SPAN conducted online programs using open-source software to facilitate understanding of concepts by students and development of skills. In this semester, SPAN also incorporated Project Based Learning (PBL) by conducting a project-based workshop to give students a feel of considering systems as a whole. SPAN also conducted an interactive session with faculty and students of MIT-WPU, Pune for mentoring of students to participate in technical competitions with emphasis on robotics.

SPAN ACTIVITIES - EVEN SEMESTER (2020-2021)

| S. NO.	DATE	PROGRAM	BATCH	NUMBER OF STUDENTS
1	31.5.2021, 1.6.2021, 2.6.2021	Hands on Workshop Electronics Made EZ – Analog Electronics Workshop	S2 ECE	28
			S2 RA	27
2	7.6.2021 8.6.2021 9.6.2021	Hands on Workshop Electronics Made EZ – Analog Electronics Workshop	S4 ECE	20
			S4 RA	43
3	14.6.2021 15.6.2021	Embedded Systems - Project Based Workshop	S4 EC	26
			S4 RA	38
4	18.8.2021	Interactive Session with MIT-WPU Robocon Tech Team	S2 EC	5
			S2 RA	18
			S4 EC	7
			S4 RA	13

Hands on Workshop Electronics Made EZ – Analog Electronics Workshop

Recognizing the importance of hardware software codesign, the workshop was designed to enable a thorough base in the fundamentals of analog electronics through learning by application and exploration. This workshop shows participants how easy and enjoyable it is to assemble and test electronic circuits. Participants used resistors, capacitors, diodes, LEDs, BJTs, opamps and Timer ICs to build useful and fun projects with the underlying objective of learning fundamental concepts of the components, use of datasheets and design concepts. Tinkercad provided a useful platform for students to actually implement their circuits even during the online classes during the pandemic.
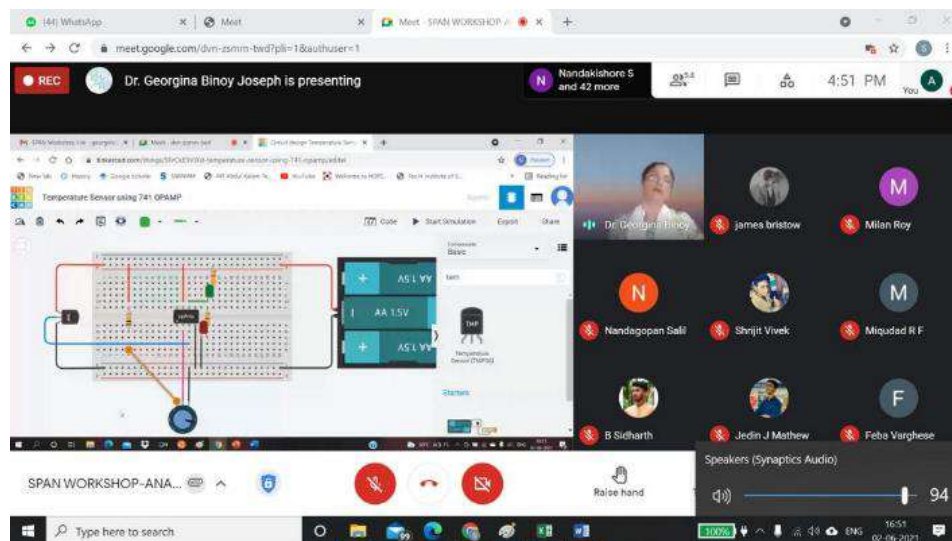

Embedded Systems – Project Based Workshop

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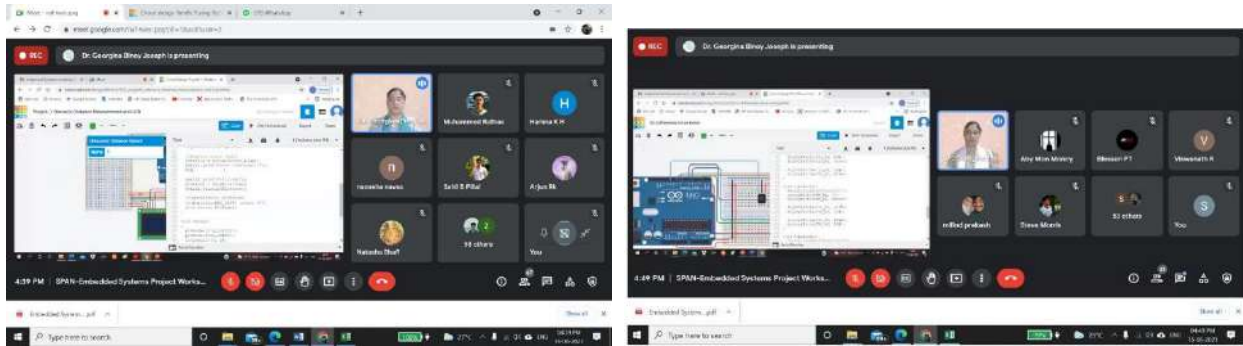
1. A system that measures the distance from an obstacle, measures the temperature, detects the presence of Toxic Gas and displays the result on an LCD

2. A Remote Controlled (RC) Differential Drive Robot

The final task was to integrate the two systems into one whole.
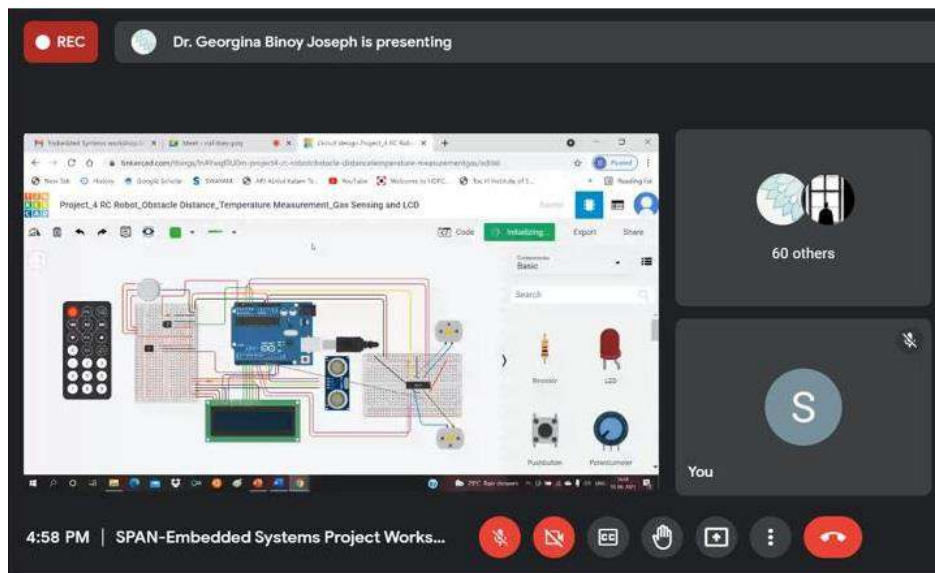
Interactive Session with MIT-WPU Robocon Tech Team

An interactive session with Maharashtra Institute of Technology-World Peace University (MIT-WPU) Tech Team was organized on 18.8.2021. The team is one of the leading teams at Robocon both at national and international levels. The session was led by Mr. Soham Patil, student leader MIT Tech Team. The session mainly focused on the team work and efforts required for budding engineers to showcase their technical skills at international competitions. The team stressed on the multidisciplinary nature of such competitions and also introduced new ideas and technologies they have implemented during various stages of their progress in Robocon competitions. Forty-three students along with faculty members of

Department of Electronics attended the session. The session was well coordinated by Mrs. Bhakti Paranjape, Assistant Professor, Department of E &TC MIT WPU.
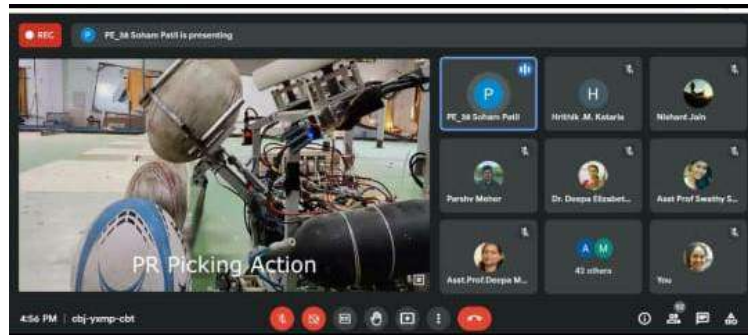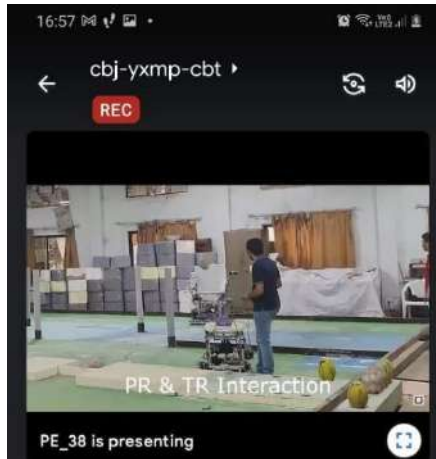
# SPAN ACTIVITIES - ODD SEMESTER (2020-2021)

S. NO.	DATE	PROGRAM	BATCH	NUMBER OF STUDENTS
SPAN Programs for TIST Students				
1	16.11.2020	Robot Modeling and Visualization using URDF and rviz (ROS)	S3 CSE	26
2	8.12.2020	Verilog Programming and Simulation using EDA Playground	S3 RA	53
3	16.12.2020	Image Processing using OpenCV-Python	S3 CSE	31
S. NO.	**DATE**	**PROGRAM**	**SCHOOL**	
SPAN Programs @ School				
1	14.7.2020	Career Opportunities for Engineering Aspirants - Technical Social Outreach	Sree Narayana Public School, Poothotta	
2	3.12.2020	Engineering the future with Electrobots - Technical Social Outreach	St. Sebastian's HSS, Palluruthy	

S. NO.	DATE	PROGRAM	Attended by
SPAN Programs for TIST Faculty			
1	15.1.2021	Proteus Simulation Software	Faculty and Lab Instructors, DoE (ECE, RA)

| S. NO.	DATE	PROGRAM	Attended by
SPAN Programs @ National Level			
1	7.11.2020	Fundamentals of Robotic Vision using OpenCV-Python and GluonCV	Participants of AICTE-STTP on Robotics, Artificial Intelligence and Control
2	3.12.2020	Robot Modelling and Visualization using URDF and rviz	Participants of AICTE-STTP on Robotics, Artificial Intelligence and Control
3	4.12.2020	Fundamentals of Robotic Vision using OpenCV-Python and GluonCV	Participants of AICTE-STTP on Robotics, Artificial Intelligence and Control

WORKSHOP ON ROBOT MODELING AND VISUALIZATION USING URDF AND rviz (ROS)

SPAN programs were conducted by Dr Georgina Binoy Joseph on **Robot Modeling and Visualization using URDF and rviz (ROS)**. ROS is a middleware or a framework that enables efficient communication between disparate pieces of hardware and software libraries. URDF - Unified Robot Description Format is an XML format for representing a robot model. It is a collection of files that describe a robot's physical description to ROS. rviz is a powerful 3D visualization tool for ROS applications which lets us see the environment from the perspective of the robot.
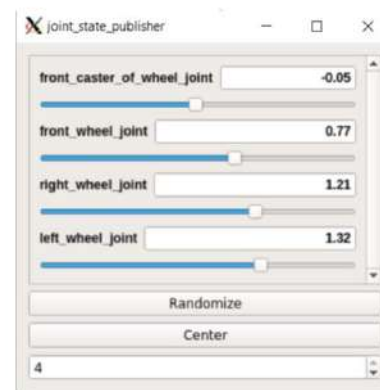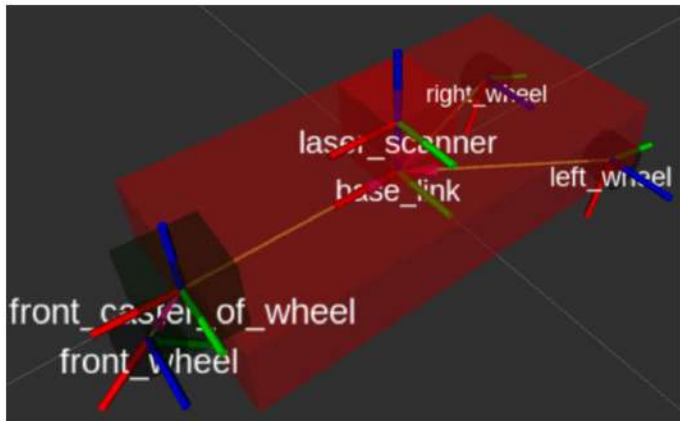
WORKSHOP ON IMAGE PROCESSING USING OpenCV-PYTHON

The course RAT281 Basics of Robotics has a module dealing with image processing. This course does not have a lab associated with it. 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.
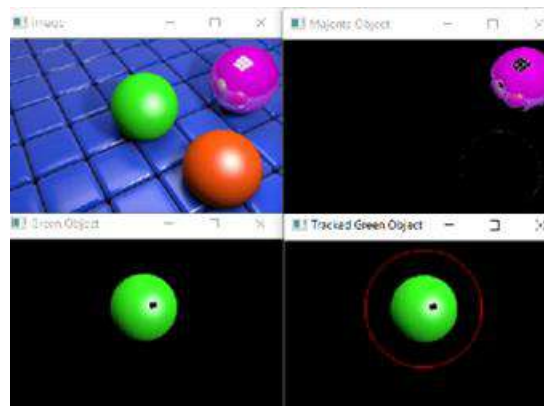

WORKSHOP ON VERILOG PROGRAMMING AND SIMULATION USING EDA PLAYGROUND

This workshop introduced open-source tools for digital design. This enables the students to describe digital circuits using various kinds modelling – gate level, data flow, behavioral modelling in Verilog. Using these tools, students can describe their designs and simulate them to test functionality.

FUNDAMENTALS OF ROBOTIC VISION USING OpenCV-Python AND GluonCV

The approach followed in this workshop conducted by Dr Georgina Binoy Joseph included Introduction to select Open-Source Software, Fundamental Concepts of Robotic Vision, Demonstration of fundamental concepts using Open-Source Software. OpenCV (Open-Source Computer Vision Library) is an open-source computer vision and machine learning software library. Use of OpenCV-Python for the image processing required for basic robotic vision was familiarized. The ApacheMXNet Framework is a deep learning framework that provides the software tools for building and training neural network models for computer vision and other applications. GluonCV is an MXNet eco system library which is an open-source, flexible, easy to use computer vision toolkit. Using Gluon CV on Anaconda - Jupyter Notebook, image classification using ResNet pre trained on ImageNet1K and object detection using SDD-Yolo pretrained on COCO dataset were carried out.
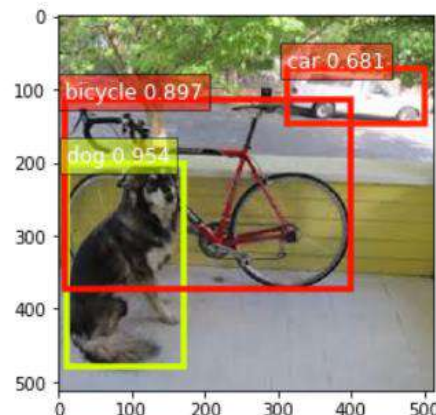

SOCIAL OUTREACH

As a part of its **Social Outreach Program,** the **Department of Electronics** conducts **SPAN Programs @ School.** Dr. Deepa Elizabeth George, HOD, Department of Electronics, TIST conducted an orientation program on "Career Opportunities for Engineering Aspirants" for XI and XII standard students of Sree Narayana Public School, Poothotta on 14th July 2020.

A Virtual Social Outreach program on " Engineering The Future With Electrobots" was conducted for the students of St. Sebastian's HSS Palluruthy on 3rd Dec 2020 by Asst. Prof. Dhanya R and Asst. Prof.

Swathy Satheesh. The technical social outreach initiative aims to create awareness among school students about various innovations and developments in technology and make them focused towards their future goals. In the sessions, students were introduced to various emerging fields in the area of Electronics & Communication Engineering and were also made aware of the future scope of Electronics in the field of Robotics & Automation.
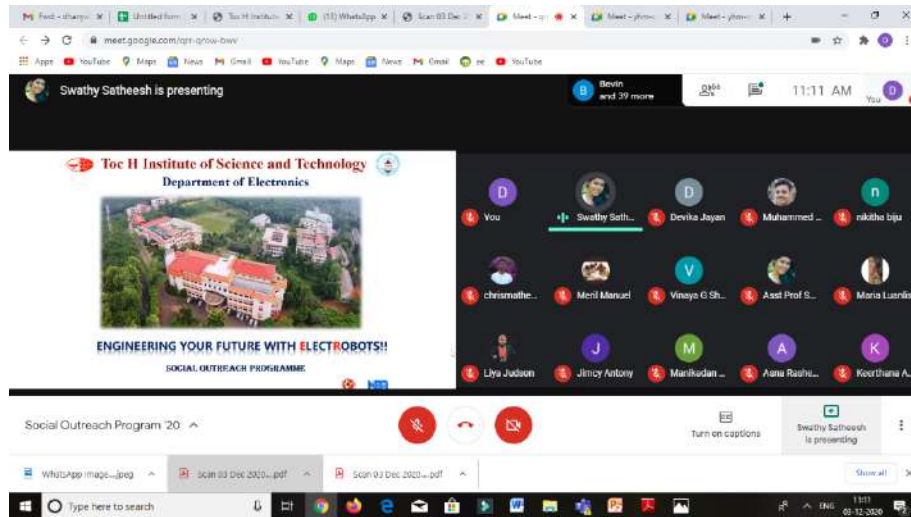
WORKSHOP ON PROTEUS SIMULATION SOFTWARE

SPAN conducted a one-day workshop on Proteus Simulation Software for faculty and Lab Instructors. The resource person was Mr. Pavansai from Cybermotion Technologies Pvt. Ltd.. The workshop was conducted via Zoom. The participants joined the workshop on the same platform and worked on the systems in the Department lab that is equipped with Proteus Simulation Software. Activities on creating bot Analog and Digital lab experiments were first undertaken. This will be useful for implementing innovative teaching methodology for both theory and labs particularly during the Covid19 pandemic.   Microcontroller based firmware projects were also created and simulated using Proteus software.

Dr. Georgina Binoy Joseph,
Coordinator, SP⌒N