Two-day hands on session on Robotics and computer vision

for faculties of Department of EEE

Dates: 6-12-19 & 7-12-19 **Venue:** IIoT lab (PSNA – Bluetronics Centre of Excellence)

Course requirements:

- Computer System with Ubuntu Operating System.
- All the participants should bring their scientific calculator.
- Non – masked internet connection via Ethernet / Wi-Fi.
- Maximum Participants – 14.

Course description:

This course is about the hands-on session about robotics fundamentals, robotic arm, setting up the robot and the kinematics & dynamics of the robot. It also deals with the usage of open computer vison libraries like OpenCV for the robotic applications. The participants will get hands on experience in calculating kinematics for the robotic platforms and will get experienced in handling computer vision libraries.

Course contents:

Session	Title	Session type
Day 1	Robotics – Introduction and evolution, Design, strategies, control methodologies, applications, Types of robots – Types of sensors	Theoretical session with Hands-on session in simulation
	Break	
	Python brush up sessions – Python interfacing with hardware board – Python GUI – Retrieving sensor parameters with Python – Python libraries	Practical Hands-on session on python
	Lunch Break	
	Introduction to Computer vision framework –OpenCV – Introduction, installation, sample programs	Practical Hand-on session on OpenCV with python
	Break	
	Face detection – colour detection – Object detection – 2D Position estimation on object – OpenCV and hardware interfacing.	Practical Hand-on session on OpenCV with python and hardware board
Day 2	Introduction to 2wd robot platform – simulation of differential drive platform – Introduction to robot manipulator – Degrees of freedom – Forward kinematics (FK) – Inverse Kinematics (IK)	Hands-on session in simulation
	Break	
	Robot manipulator setting up – Interfacing with python – Implementing FK and IK to real world problems	Practical Hand-on session with python and hardware board
	Lunch Break	
	Python GUI for Robotic manipulator - Robotic manipulator interfacing with OpenCV using python – Task planning	Practical Hand-on session on OpenCV with python and hardware board
	Break	
	Team activity	Sample project