

# Center of Excellence (CoE)

## COE 1:Computer Vision Laboratory

The **Computer Vision Laboratory** provides a state-of-the-art research and development environment for students, faculty, and researchers to explore advanced applications of **Artificial Intelligence (AI), Machine Learning (ML), Deep Learning (DL), and Computer Vision**. The laboratory supports curriculum-based learning, interdisciplinary research, innovation, and industry-oriented projects in domains such as **medical image analysis, biometrics, document image analysis, agriculture, smart surveillance, robotics, and intelligent automation**.

The laboratory is equipped with advanced imaging and high-performance computing facilities that enable students to acquire, process, analyze, and interpret visual data using modern AI techniques.

### Laboratory Facilities

#### 1. Bosch Fundus Camera

The laboratory houses a **Bosch Portable Fundus Camera**, a specialized retinal imaging device used for capturing **high-resolution fundus images** of the human eye. The device is extensively utilized for research in **medical image analysis**, particularly in the early detection and diagnosis of retinal diseases such as diabetic retinopathy, glaucoma, age-related macular degeneration, and other ophthalmic disorders.

### Specifications

- Portable fundus (retinal) imaging device, Camera unit with posterior imaging module
- Rechargeable batteries, Cradle with adapter and USB connectivity, Target fixation units for accurate image acquisition

### Applications

- AI-based retinal disease detection, Medical image analysis, Deep learning model development, Explainable AI (XAI) research, Healthcare diagnostics

## 2. High-Performance GPU Workstation

The laboratory is equipped with **Dell Precision 5820 Tower GPU Workstations**, designed to support computationally intensive AI and Deep Learning applications.

### System Specifications

- Intel C422 Chipset, Intel Xeon W-Series Processor Support, Up to 512 GB ECC DDR4 Memory, Multiple PCIe Gen3 expansion slots supporting high-end GPUs, NVMe SSD and SATA storage with RAID support, Integrated Gigabit Ethernet, TPM 2.0 Security and Secure Boot

The GPU workstation enables efficient training and deployment of deep learning models using frameworks such as **TensorFlow, PyTorch, OpenCV, Keras, and CUDA**.

### Applications

- Deep Learning, Computer Vision, Image and Video Analytics, Object Detection
- Image Classification, Generative AI, Large-scale AI model training

### Research and Learning Support

The Computer Vision Laboratory facilitates:

- AI-based medical image analysis and healthcare research
- Biometric recognition and intelligent document analysis
- Precision agriculture using computer vision
- Smart surveillance and security systems
- Robotics and autonomous vision applications
- Undergraduate and postgraduate research projects
- Industry-sponsored projects and funded research
- Student innovation, hackathons, and startup development

The laboratory provides students with hands-on experience in developing **AI-enabled vision systems**, fostering innovation, research excellence, and practical skills aligned with current industry and societal needs.



## COE 2:IoT Laboratory Infrastructure

Our Internet of Things (IoT) Laboratory provides a state-of-the-art environment where students, researchers, and faculty design, develop, and deploy innovative IoT solutions. Equipped with advanced embedded systems, sensors, communication modules, robotics platforms, and cloud technologies, the laboratory supports experiential learning, interdisciplinary research, and industry-driven innovation.

### Hardware Platforms

- Arduino Mega Development Boards, Raspberry Pi 3/4 Systems, ESP8266 & ESP32 Development Boards, NodeMCU Wi-Fi Modules

## **IoT Sensors**

- MQ-2, MQ-8, MQ-9 & MQ-135 Gas Sensors,DHT22 Temperature & Humidity Sensor, Soil Moisture Sensor,Rain Sensor,Ultrasonic Sensor,IR Sensor,LDR Sensor,Load Cell GPS Module,RFID Reader & Tags,ADXL345 Accelerometer,NPK Sensor,Color Sensor

## **Robotics & Automation**

- Robot Chassis Kits,DC Motors,Servo Motors,L293N Motor Driver,Wheels & Mechanical Components,Pick and Place Modules

## **Communication Technologies**

- GSM Module,Bluetooth Module, ZigBee Module,Wi-Fi Connectivity,I2C Communication Interface

## **Computing & Software**

- Desktop Computers,Arduino IDE,Raspberry Pi OS,Python,Node-RED,MQTT, ThingSpeak, BLYNK IOT PLATFORM

## **Laboratory Facilities**

- LCD Display Modules. USB Cameras, High-Speed Internet, Wi-Fi Network, Smart Projector, UPS Power Backup, Modern Workstations, Storage Cabinets, Laboratory Furniture

## **Laboratory Highlights**

1. Industry-Oriented Learning, Hands-on Practical Sessions, Smart IoT Project Development, AI &IoT Integration, Research & Innovation Support, Industry 4.0 Applications, Mini & Major Projects, Hackathons& Workshops, Startup and Product Development

