**Training cum Internship Program**

**on**

**Transferring Academic Knowledge in R&D**

**(TRACK R&D)**

1. **Hands-on training for development of module on Internet of Things (IoT), specifically focusing on IoT architectures, applications, standards and protocols.**
2. **Sensor Communication:** Establishing sensor communication, types of sensor interface (I2C, Serial, Analog sensors etc.)
3. **Server-Clint Configuration:** Setting up a Serve-Clint configuration for establishing IoT communication
4. **Web Server Setup:** Empowering and setting up ESP32/ NODEMCU etc. as web server.
5. **Controlling through IoT:** Acquisition, controlling sensor data through IoT communication
6. **IoT Communication:** Procedure for setting up HTTP/MQTT etc. for IoT communication.
7. **Robotic and its real-world application emphasizing battery management system, selection of motor for robotics.**
8. **Robot Design:** Build and assemble robot prototypes, focusing on functional design and component placement.
9. **Sensor Integration:** Connect and calibrate sensors to gather and use real-time data for robot decision-making.
10. **Actuator Control:** Program and test motors and actuators for precise movement and task execution.
11. **Programming:** Develop and debug code that controls robot behaviour, integrates sensors, and coordinates actuators.
12. **Robot Simulations:** Use simulation software to model, test, and refine robot designs and behaviours in virtual environments.
13. **Hands-on training in Image processing applications for the development of different sensing systems.**
14. **Sensor Overview:** Overview of different sensors for acquiring data with special focus on illumination arrangement for data acquisition.
15. **Data Acquisition:** Activing sensors for capturing data.
16. **Environment Setup:** Establishing require environment for sensors.
17. **Hardware Requirement:** Capturing data in computing devices special focus on requirement of electronics/hardware
18. **Programming:** Develop and debug code that controls sensor data acquisition, analysis and development of decision support system.
19. **Hands-on training for developing electronic-based sensing systems with special focus on development of Electronic Olfaction systems.**
20. **Sensor Design:** Different types of sensor design and fabrication focusing on Gas sensor, MoS Sensor and others.
21. **Sensor Integration:** Connect and calibrate sensors to gather and use real-time data for sensing of different environmental parameters.
22. **Electronic Assembly:** Integration of electronic circuit for acquisition of sensors data.
23. **Programming:** Develop and debug code that controls sensor data acquisition, analysis and development of decision support system.
24. **Computing board:** Application of modern computing boards (Raspberry Pi, Arduino, Jetson, etc.) for development of instruments.
25. **Hands-on training on developing instruments for quality inspection of commodities.**
26. **Problem Identification:** Identifying need of the society with special focus on quality issue of commodities.
27. **Conceptualization of Solution:** Generation of idea for solving the pain points.
28. **Conceptualization of System:** Generation of idea for development of hardware module.
29. **Hardware System Integration:** Development of hardware module and integration.
30. **Programming:** Develop and debug code that controls hardware-software interaction.
31. **Hands-on training on Bio-sensing and development of instruments for Bio-medical engineering.**

a. Sensor Design: Different types of sensor design and fabrication focusing on SPE (Screen Printed Electrodes) and others.

b. Sensor Calibration: Process of calibrating sensors before actual measurement.

c. Electronic Assembly: Integration of electronic circuit for acquisition of sensors data.

d. Programming: Develop and debug code that controls sensor data acquisition, analysis and development of decision support system.

e. Computing board: Application of modern computing boards (Raspberry Pi, Arduino, Jetson, etc.) for development of instruments.

1. **Application of Cyber Security with particular reference to ethical hacking.**
2. **Cyber Security**: Way of protecting computer software, systems and networks
3. **Vulnerability**: Introduction to Vulnerabilities, Vulnerability Scanning
4. **Firewalls**: Introduction to Web Security attack, Desktop Security.
5. **Ethical Hacking**: Testing of system against potential security breaches or data threats, repairing the flaws.
6. **Design Thinking Process and Hands on application in 3D printing technologies.**

**a. Concept of Design Thinking:** What is design thinking and why it is required.

**b. Process of Design Thinking:** Different stages of design thinking.

**c. 3D Printing:** Designing concept, 3D design and its application in today’s manufacturing world