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| Course | ECE504 Internet of Things | Semester | Monsoon Semester 2024 |
| Faculty Name(s) | Anurag Lakhlani | Contact | anurag.lakhlani@ahduni.edu.in |
| School | SEAS | Credits | 3 |
| GER Category: | Not Applicable | Teaching Pedagogy Enable:YES | P/NP Course: Can not be taken as P/NP |

Schedule

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| Section 1 | 09:30 am to 11:00 am | Mon | 01-08-24 to 26-11-24 |
| | 09:30 am to 11:00 am | Wed | 01-08-24 to 26-11-24 |

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| Prerequisite | EVD220 Embedded System Design & EVD221 Embedded System Design Lab |
| Antirequisite | Not Applicable |
| Corequisite | Not Applicable |

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| Course Description | The course “Internet of Things” focuses on connecting sensors, actuators and other electronic devices to internet using two platforms – Arduino Platform and Raspberry Pi platform. The data and information sent to the internet can be collected/stored, analysed and utilized for decision making. All students will build two projects as part of the course. The example of projects may include Home Automation using IoT, Irrigation Management System using IoT, etc. The course is divided into following units.<br><br>**Unit 1**: Introduction to Internet of Things: Review of Embedded Systems, IoT Fundamentals, Fundamental Building blocks of IoT Devices, IoT in various domains of life.<br>**Unit 2**: Introduction to Arduino Platform<br>**Unit 3**: Actuators: Study of selected actuators, their operating principles, application etc.<br>**Unit 4**: Sensors: study of fundamental principles of sensors for various parameters like temperature. Their comparisons and use in IoT.<br>**Unit 5**: Internet and communication protocols<br>**Unit 6**: Introduction to Raspberry Pi Platform<br>**Unit 7**: Linux Fundamentals<br>**Unit 8**: Introduction to Programming in Python<br>**Unit 9**: Selected Advanced Topics in Internet of Things |
| Course Objectives | (1) To design Embedded Systems using the state of the art platforms (including Arduino and Raspberry Pi Platforms) to utilize and implement IOT features.<br>(2) To learn, utilize and implement the principles of IOT along with the Embedded Systems for various applications. |
| Learning Outcomes | (1) Students will develop two projects in IoT Domain in this course.<br>(2) Students will learn two IoT platforms : Arduino and Raspberry Pi<br>(3) Students will learn and utilize programming skills in C and Python |
| Pedagogy | ENABLE (Includes Project Based Learning, Lectures, Class discussions and Presentations) |
| Expectation From Students | Regularly attend lectures |

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| Assessment/Evaluation | • Mid-Semester Examination:<br>  ◦ Mid Semester Exam - 25%<br>• End Semester Examination:<br>  ◦ End Semester Exam - 25%<br>• Other Components:<br>  ◦ Laboratory Report Preparation - 25%<br>  ◦ Project - 25% |
| Attendance Policy | As per Ahmedabad University Policy.<br>As per Ahmedabad University's Attendance Policy. |
| Project / Assignment Details | Students will work on two projects. The first will be based on Arduino platform and c programming. The second will be based on Raspberry Pi platform and Python programming. The examples of projects are: Smart Home, Intelligent Building, Smart irrigation System, Smart Hospital etc. |
| Course Material | |
| Additional Information | |

# Session Plan

| NO. | TOPIC TITLE | TOPIC & SUBTOPIC DETAILS | READINGS,CASES,ETC. | ACTIVITIES | IMPORTANT DATES |
|---|---|---|---|---|---|
| 1 | Unit 1: Introduction to IoT | Introduction to Internet of Things: Review of Embedded Systems, IoT Fundamentals | Reference Book No.1,Chapter 1 | Lecture | |
| 2 | | Fundamental Building blocks of IoT Devices, IoT in various domains of life. | Reference Book No. 1, Chapter 2 | Lecture | |
| 3 | Unit 2: Introduction to Arduino Platform | Introduction to Arduino Platforms | Reference to Arduino Website | Introduction to Arduino Experiments | |
| 4 | | Experiments with Arduino Platforms Part 1 | Reference Book No. 2, Chapter 7, 8 | Project | |
| 5 | | Experiments with Arduino Platforms Part 2 | Reference Book No. 2, Chapter 7, 8 | Discussion on Arduino Experiments | |
| 6 | Unit 3: Actuators | Actuators : Study of selected actuators, their operating principles, application etc. | Reference Lecture Notes and Selected Datasheets | Lecture and Experiments | |
| 7 | | Actuators Part 2 and Set of Experiments | Reference Book No. 3, Chap. 1, 2 | Lecture and Experiments | |
| 8 | | Actuators Part 3 and Set of Experiments | Reference Book No. 3, | Lecture and Experiments | |
| 9 | | Actuators Part 3 and Set of Experiments | Reference Book No. 3, Chap. 3,4 | Lecture and Experiments | |
| 10 | Unit 4: Sensors | Sensors: study of fundamental principles of sensors for various parameters like temperature. Their comparisons and use in IoT. | Reference Book No. 4, Chap. 2, & 7 | Lecture and Experiments | |
| 11 | | Sensors Part 2 | Reference Book No. 4, Chap. 3, 4 & 10 | Lecture and Experiments | |

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| 12 | | Sensors Part 3 | Reference Book No. 4, Chap. 3, 4 & 10 | Lecture and Experiments | |
| 13 | | Sensors Part 4 | Reference: Lecture Notes and Selected Datasheets | Lecture and Experiments | |
| 14 | In-Semester Exam | | | | |
| 15 | Unit 5: Internet and communication protocols | Introduction to Internet Protocols | Reference: Arduino Website | Lecture and Experiments | |
| 16 | | Internet and Communication Protocols Part 1 | Reference : Lecture Hand-outs on Arduino Ethernet Shield | Lecture and Experiments | |
| 17 | | Internet and Communication Protocols Part 2 | Reference: Data Sheet of Wi-Fi Module | Lecture and Experiments | |
| 18 | | Internet and Communication Protocols Part 3 | Reference Book No. 5: Chapter 13 | Lecture and Experiments | |
| 19 | Unit 6: Introduction to Raspberry Pi Platform | Introduction to Raspberry Pi Platform: Part 1 | Reference Book No. 6, Chap. 1 | Lecture and Experiments | |
| 20 | | Introduction to Raspberry Pi Platform: Part 2 | Reference Book No. 6, Chap 6, 7 | Lecture and Experiments | |
| 21 | Unit 7: Linux Fundamentals | Linux Fundamentals Part 1 | Reference Book No. 6, Chap. 2 | Lecture and Experiments | |
| 22 | | Linux Fundamentals Part 2 | Reference Book No. 6, Chap. 2 | Lecture and Experiments | |
| 23 | Unit 8: Python Programming | Introduction to Python Programming | Reference Book No. 6, Chapter 11 | Lecture and Experiments | |
| 24 | | Programming in Python | Reference : Book No. 2, Chapter 2 | Lecture and Experiments | |

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| 25 | Unit 9: Advanced Topics | Selected Advanced Topics in Internet of Things: Part 1 | Reference Book No. 5, Chapter 1 | Lecture and Experiments | |
| 26 | | Selected Advanced Topics in Internet of Things: Part 2 | Reference Book No. 5, Chapter 4, 5 | Lecture and Experiments | |
| 27 | | Project Presentations | Project Presentations | Project Presentations | |
| 28 | Reflections and Review | | | | |
| 29 | Reflections and Review | | | | |
| 30 | End-Semester Examination | | | | |