

Indian Institute of Technology Guwahati

Course Number & Title: CS 4101: IoT App Development	
L-T-P-C: 3-0-0-6 Offered as (Compulsory / Elective): Open Elective	
Pre-Requisite: Programming Knowledge	
Preamble / Objectives (Optional): IoT is quite a remarkable technology. It's a fact that users as well as organizations are increasingly relying on internet-connected devices, popularizing the use of IoT Applications. The main objective of an IoT application is to sense physical environment, gather sensed data, examine it, respond back to the system, and provide valuable information and new insight to the application user. Therefore, it is beneficial to have the knowledge about IoT application development. In this course, the student will learn the fundamentals of IoT, different components of an IoT application, and IoT App development. IoT App development is the process of designing, developing, prototyping, testing, and making it live in real life. The student will learn all these steps, and will build their own IoT application prototype using off-the-shelf available Arduino/NodeMCU boards, sensors and actuators, as a course project. They would also learn the required programming as a major stepping stone to develop their own IoT application. Additionally, few demos will be shown to the students to have an understanding about advanced IoT application development using IoT devices.	
Course Content/ Syllabus: <i>Introduction to IoT Applications:</i> Introduction to IoT, Different components of IoT Applications. Sensors and Actuator. Microcontroller. Access Technologies. Edge and Cloud. Internet. Web Applications. <i>Programming with Arduino / NodeMCU:</i> Overview of basic Arduino/NodeMCU Board, Arduino IDE. Arduino Programming. Getting Started with In-built Arduino Sketches. Writing sketches for Digital IO, Analog IO, Reading Data from Sensors, Sending Command to Actuators, Storing Data in Memory, Showing Results in Connected Display (LCD, OLED). Serial Communication Protocols (UART, I2C, SPI) and their use. <i>Basics of IoT App Development:</i> Connecting different components (Microcontroller, Sensor, Actuator, Access Network, Internet, Cloud). Establish communication from Sensor to Cloud Server. Sending E-mail/SMS notifications to Application Users. <i>Advanced IoT App Development:</i> Overview of Smart IoT Device and Advanced IoT Access Technologies. Developing advanced IoT Application using smart IoT devices.	
Text Books	
1.	A. Bahga, V. Madiseti; <i>Internet of Things: A Hands-on Approach</i> , 1 st Ed., Universities Press (India) Pvt. Ltd., 2015.
2.	Y. Kanetkar, S. Korde; <i>21 Internet of Things (IOT) Experiments: Learn IoT, the programmer's way</i> , 1 st Ed., BPB Publications, 2018.
3.	S. Monk, <i>Programming Arduino: Getting Started with Sketches</i> , 2 nd Ed, McGraw-Hill Education, 2016
4.	D. Hanes, G. Salgueiro, P. Grossetete, R. Barton, and J. Henry, <i>IoT Fundamentals – Networking Technologies, Protocols and Use Cases for the Internet of Things</i> , 1 st Ed, Cisco Press, 2017.