CIT : IoT(Smart Computing)

Gandaki University

IV Year, II Sem

Program: Bachelor of Information Technology
Subject: IoT(Smart Computing)   Year: IV
Course Code: CIT   Semester: II
Credit Hour: 2+1=3   Lab Type: Computer Lab
Contact Hours: 45   Lab Hours: 15

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1 Course Objectives

The main objective of this course is to provide students with foundational knowledge and research insights into IoT and Smart Computing, preparing them for advanced studies and practical applications in the field.

Course Description

This course introduces the key concepts and technologies of the Internet of Things (IoT) with a focus on Smart Computing. It covers essential aspects such as IoT architecture, sensing and actuation, communication protocols, and data processing. The focus will be on providing research insights and practical knowledge for students interested in pursuing advanced studies and research in IoT.

2 Course Outcomes

By the end of this course, students will have a solid understanding of the fundamental concepts and technologies of IoT and Smart Computing. They will be able to design, implement, and analyze IoT systems, integrating sensors, devices, and communication protocols effectively. Additionally, students will be equipped with the knowledge to address security and privacy challenges in IoT applications and develop innovative solutions for real-world problems.

3   Course Content

Unit 1: Overview of IoT (Smart Computing) (4 Hrs.)

1. Definition and Characteristics of IoT

2. History and Growth of the IoT Industry

3. Fundamental Components of IoT System

4. Applications of IoT in various industries

Unit 2: Sensors and Devices in IoT (4 Hrs.)

1. Overview of Sensors and Devices

2. IoT Device Hardware

3. Key Considerations in Device Selection and Integration

4. Gateways for IoT

Unit 3: IoT Connectivity (4 Hrs.)

1. Introduction to Connectivity

2. Cellular and Satellite Connectivity for IoT

3. WiFi/Bluetooth/LPWAN Connectivity for IoT

Unit 4: Data Processing and Platforms (4 Hrs.)

1. Introduction to Cloud and Edge Computing

2. Overview of IoT Platforms

3. Criteria for Selecting an IoT Platform

4. Integration of IoT with Custom Applications

Unit 5: IoT Protocols and Machine Learning (6 Hrs.)

1. Overview of IoT Protocols

2. Key Data Protocols: MQTT, CoAP

3. Key Network Protocols: HTTP, LoRaWAN, Bluetooth, ZigBee

4. Introduction to Machine Learning for IoT

Unit 6: Security and Privacy in IoT (4 Hrs.)

1. IoT Security Challenges and Threats

2. Authentication and Access Control in IoT

3. Data Privacy and Compliance in IoT

4. Security Best Practices for IoT Deployments

Laboratory Work

Lab Contents

1. **Introduction to IoT Development Platforms** (3 Hrs.)

   - Setting up Raspberry Pi/Arduino
   - Basic Programming for IoT Devices

2. **Sensors and Actuators** (4 Hrs.)

   - Connecting and Programming Sensors
   - Real-world Application Development

3. **IoT Communication** (4 Hrs.)

   - Network Setup for IoT Devices
   - Data Transmission and Reception

4. **Data Collection and Processing** (4 Hrs.)

   - Data Collection from Sensors
   - Basic Data Processing and Visualization

5. **IoT Project Development** (4 Hrs.)

   - Project Planning and Development
   - Presentation and Demonstration