**SYNOPSIS**

| **Register No:** | **Name:** |
|---|---|
| 1.126003101 | Harish T |
| 2.126003093 | Guru Prasath M |
| 3.126003184 | Nishanth M V |

**Project Title**: Optimizing Water Management Using LoRaWAN – Enabled IoT Framework and Behavioural Analysis

**Name of the Guide**: Dr. Manivannan D**,** Associate Dean, Infrastructure, School of Computing


**Abstract**

This project focuses on sustainable water management by deploying a LoRaWAN-based IoT system on a university campus. Smart meters placed across key areas like hostels and quarters collect water flow data and transmit it over a low-power, long-range network. These readings, captured weekly and monthly, are analysed using a GRU-based deep learning model to predict future consumption patterns and enable smart irrigation control. The system considers variables like holidays and academic schedules to enhance accuracy and utility. Compared to traditional monitoring, the solution offers scalable, cost-effective insights and encourages sustainable water usage in intermittent water supply systems (IWS).


**Specific Contribution**:

1. GRU-Based Water Flow Prediction Model
2. Designed Pi code.
3. ESP32 Integrated with Sensor Logic (Arduino IDE)

**Specific Learning:**

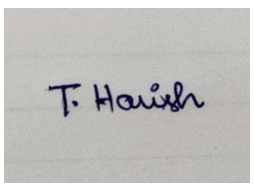
- Pre-processed time-series data and understood GRU's role in sequence modelling.
- Gained practical experience with MQTT, TCP, and UART protocols.
- Integrated ML models with IoT pipelines for real-time control applications.

**Technical Limitations & Ethical Challenges faced:**

- Data synchronization issues between sensor and model resolved using interpolation.
- Live data handling on Raspberry Pi managed using MQTT background threading.


**Keywords***: GRU (Gated Recurrent Unit), MinMaxScaler, IoT (Internet of Things), Raspberry Pi, MQTT (Message Queuing Telemetry Transport), Adafruit IO, Keras, TCP communication.*


Name & Signature of the Student




Signature of Guide