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Module Code: PUSL2022	Module Name: Introduction to IOT
Coursework Title: Water Supply System for Fruit Plant	
Deadline Date: 15/08/2023	Member of staff responsible for coursework: Mr. Chaminda Attanayake Mr. Isuru Sri Bandara
Programme: BSc (Hons) Software Engineering Plymouth	

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Referred Coursework

2022 – 2023

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Chapter 01: Introduction

The Water Supply System for the Fruit Plant is an IoT-based solution aimed at efficiently managing the water resources of a fruit processing plant located in the Rathnapura area. The plant relies solely on groundwater sources, facilitated by three wells. The project aims to ensure uninterrupted water supply during both normal and dry periods, prevent water wastage, and monitor the water distribution system for any issues.

Chapter 02: Objectives

The main objectives of this project are as follows:

- Develop an IoT-based water management system to optimize water usage and distribution.
- Ensure a continuous water supply to the processing plant by intelligently utilizing the three wells.
- Implement a reliable mechanism to refill the central sump and the water tower as per demand.
- Monitor and detect anomalies, malfunctions, and leaks within the water supply system.
- Provide remote access and control over the system for efficient management.

Chapter 03: Problem Statement

The fruit processing plant relies on groundwater sources from three wells for its water supply. The challenge lies in managing the distribution of water efficiently, especially during dry periods when all three wells are required. Additionally, monitoring the water levels in the wells, sump, and water tower, as well as detecting and responding to anomalies, poses a technical challenge.

Chapter 04: Technologies

The proposed solution will leverage the following technologies:

- **IoT Devices:** Water level sensors for wells, sump, and tanks; flow rate sensors; pressure sensors.
- **Communication Networks:** Mobile data networks (Dialog/Mobitel) for remote communication.
- **Microcontrollers:** Raspberry Pi or Arduino for data processing and control.
- **Communication Protocols:** MQTT for data exchange between devices and central control.
- **Data Storage:** Cloud-based storage for historical data and analytics.
- **User Interface:** Web-based dashboard for remote monitoring and control.

Chapter 05: Solution/Methodology

The solution consists of the following key components:

- **Water Level Sensing:** Each well, the sump, and the water tower are equipped with water level sensors to monitor real-time water levels.

- **Data Processing:** Microcontrollers collect sensor data, process it, and make control decisions based on predefined algorithms.

- **Communication Model:** MQTT protocol is used to facilitate communication between devices and the central control unit located in the sump room.

- **Central Control Unit:** The central control unit manages the overall system, monitors water levels, triggers pumps, and maintains a schedule for well rotation.

- **Remote Access:** A web-based dashboard provides remote access to monitor system status, water levels, and historical data. It also allows for manual control if required.

- **Anomaly Detection:** The system employs predefined thresholds to detect anomalies, such as low water levels or malfunctioning pumps, and sends alerts to responsible personnel.

- **Automated Refilling:** The system refills the central sump and the water tower as per demand, ensuring an adequate water supply.

Chapter 06: Conclusion

The IoT-based Water Supply System for the Fruit Plant offers an efficient and automated approach to manage the water distribution and supply. By leveraging real-time data, remote access, and smart algorithms, the system optimizes water usage, reduces wastage, and enhances the reliability of the water supply, thus contributing to the sustainability and smooth operation of the fruit processing plant. The proposed solution addresses the challenges of water management in a comprehensive and technologically advanced manner.

Chapter 07: References

• Images – AI generated, Google.

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