VISVESVARAYA TECHNOLOGICAL UNIVERSITY

Jnana Sangama, Belagavi – 590014.

An Internship Report

On

"Smart Water Management System"

Submitted in partial fulfillment of the requirement for the award of degree of

BACHELOR OF ENGINEERING

In

COMPUTER SCIENCE & ENGINEERING

By

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Under the guidance

Sai Charan Teja

2024 - 2025

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

A P S COLLEGE OF ENGINEERING

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Evaluation Sheet

Title of the Project: Smart Water Management System

Name of the Students: Sharanya P

Manasa

Kshithija S Raj

External Supervisor:

_____

Internal Supervisor:

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Date:

Place:

Project Completion Certificate

I, Sharanya P (1AP21CS040), hereby declare that the material presented in the Project Report titled **"Smart water Management System"** represents original work carried out by me in the **Department of computer Science** at the **APS college of Engineering, Bangalore** during the tenure **2 October, 2024 – 12, December, 2024**.

With My signature, I certify that:

- I have not manipulated any of the data or results.
- I have not committed any plagiarism of intellectual property and have clearly indicated and referenced the contributions of others.
- I have explicitly acknowledged all collaborative research and discussions.
- I understand that any false claim will result in severe disciplinary action.
- I understand that the work may be screened for any form of academic misconduct.

Date: **Student Signature**:

In my capacity as the supervisor of the above-mentioned work, I certify that the work presented in this report was carried out under my supervision and is worthy of consideration for the requirements of the B.Tech. Internship Work.

Advisor's Name: **Sameerana CP** **Guide Name: Sai Charan Teja**

Advisor's Signature **Guide Signature**

Project Completion Certificate

I, Manasa (1AP21IS018), hereby declare that the material presented in the Project Report titled **"Smart Water Management System"** represents original work carried out by me in the **Department of Information Science** at the **APS college of Engineering, Bangalore** during the tenure **2 October, 2024 – 12, December, 2024**.

With My signature, I certify that:

- I have not manipulated any of the data or results.
- I have not committed any plagiarism of intellectual property and have clearly indicated and referenced the contributions of others.
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Date: **Student Signature**:

In my capacity as the supervisor of the above-mentioned work, I certify that the work presented in this report was carried out under my supervision and is worthy of consideration for the requirements of the B.Tech. Internship Work.

Advisor's Name: **Sameeranna CP** **Guide Name: Sai Charan Teja**

Advisor's Signature **Guide Signature**

Project Completion Certificate

I, **Kshitija S Raj**(1AP21EC005), hereby declare that the material presented in the Project Report titled **"Smart Water Management System"** represents original work carried out by me in the **Department of Electronics and Communication** at the **APS college of Engineering, Bangalore** during the tenure **2 October, 2024 – 12, December, 2024**.

With My signature, I certify that:

- I have not manipulated any of the data or results.
- I have not committed any plagiarism of intellectual property and have clearly indicated and referenced the contributions of others.
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Advisor's Name: **Sameerana CP** **Guide Name: Sai Charan Teja**

Advisor's Signature **Guide Signature**

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Chapter 1

ABSTRACT

Water conservation is one of the prime concerns in the current scenario where environmental conditions are deteriorating at an alarming rate. Smart cities, unlike the conventional system of living, are in the frontline of innovation in terms of both connectivity and technological advancement. The main idea is to use the available technology to make life easy with lesser harm to the environment. An Internet of Things (IoT) and data analytics (DA) based water management system will be a basic ground for implementation and future research on how data and IoT can be used to make this happen. This paper proposes an Internet of Things (IoT) and data analytics (DA) based water distribution cum management system that would help in optimal distribution of water based on user consumption at the plot holding level. The proposed system would not only save water misuse but also help in storing usage data for analysis and town planning at a macro-level.

Chapter 2

INTRODUCTION

Water is one of the most critical resources for human survival, yet it remains scarce in many parts of the world. As a result, the demand for water has been increasing rapidly, and the need for efficient water management systems has become increasingly important. The advent of the Internet of Things (IoT) has presented new opportunities for the development of smart water management systems that can help in the effective management of water resources

A smart water management system using IoT technology can provide real-time monitoring of water usage and help identify leaks or wastage in the system. It can also provide insights into water usage patterns, enabling better decision-making for water conservation and management. The system can also be used to manage the quality of water, ensuring that it meets the required standards for consumption.

2.1 Objective

To give a review of different smart water technologies. To make a comparison between different available smart water techniques utilized in different parts of the world. To identify and highlight the benefits observed in utilizing smart technologies such as a reduction in water loss, energy, and waste management, better revenue in farming, etc. To identify the key challenges such as high cost, cyber-attacks, data standardization, etc. that need to be addressed in the future by the researchers. To mention the political and social constraints in implementing smart technologies. To mention the solution to remove the political–social constraints.

2.2 Problem Statement

Water scarcity and inefficiency in traditional management systems result in wastage, poor resource allocation, and compromised water quality. Conventional methods lack real-time monitoring and automation to detect leaks, optimize consumption, and ensure sustainability. By leveraging IoT, a smart water management system can address these challenges through real-time data, predictive insights, and automated controls, enabling efficient and sustainable water usage.

Chapter 3

APPLICATIONS

1. Real-Time Water Quality Monitoring

- IoT sensors can continuously monitor water quality parameters such as pH, turbidity, dissolved oxygen, and contamination levels, ensuring safe and clean water for consumption and use.

2. Smart Irrigation Systems

- IoT devices optimize water usage in agriculture by monitoring soil moisture, weather conditions, and crop requirements to automate irrigation schedules and reduce water waste.

3. Leak Detection and Prevention

- IoT-enabled systems can detect leaks in pipelines and reservoirs, notify users or operators in real-time, and minimize water loss.

4. Smart Water Meters

- IoT-based smart meters allow real-time tracking of water consumption at residential, commercial, and industrial levels, providing users with insights to reduce waste and manage costs.

5. Water Distribution Management

- IoT systems monitor and control water distribution networks to ensure equitable and efficient water supply, reduce pressure imbalances, and prevent losses.

7. Energy Optimization in Water Utilities

- IoT helps optimize the energy consumption of water treatment and distribution plants by analyzing usage patterns and operational inefficiencies.

8. Rainwater Harvesting Systems

- IoT-enabled systems can manage and monitor rainwater collection, storage, and utilization to enhance water conservation efforts.

Chapter 4

COMPONENTS

4.1 Raspberry pi 4 Model B

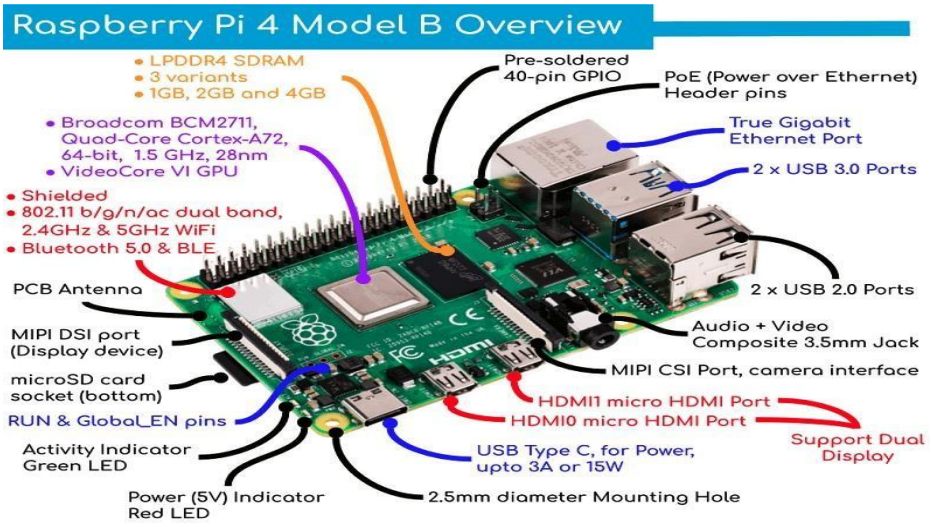


Figure 4.1: Raspberry pi 4 Model B.

The Raspberry Pi 4 Model B is a powerful single-board computer designed for a variety of applications, from education to industrial automation. It features a quad-core ARM Cortex-A72 processor, up to 8GB of RAM, dual micro-HDMI ports supporting 4K output, and USB 3.0 connectivity. Its GPIO pins enable easy interfacing with sensors, motors, and other peripherals, making it ideal for hardware projects. Built-in Wi-Fi, Bluetooth, and Ethernet provide versatile networking options. The Pi 4 is a versatile platform for learning, prototyping, and deploying IoT and embedded systems solutions.

4.2 Stepper Motor

Figure 4.2: Stepper Motor.

A stepper motor is a precision motor that moves in discrete steps, allowing for accurate control of position and speed. It operates by energizing coils in a specific sequence to produce controlled rotations, making it ideal for applications requiring precise movement, such as robotics, CNC machines, and 3D printers. Stepper motors are known for their reliability and ability to function without the need for feedback systems in many cases.

4.3 HC-SR04 Ultrasonic sensor

Figure 4.3: HC-SR04 Ultrasonic sensor

This sensor uses sonar and capable to determine the distance of object, which is not easily affected by sunlight. It is also packaged with a transmitter and a receiver.

4.4 Light sensor

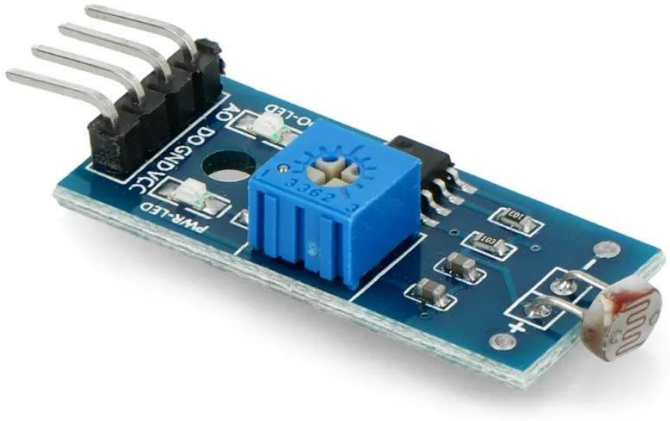


Figure 4.4: Light sensor

Light sensor module function in this work is to detect day and night. This sensor is capable to detect the brightness of environment because there is a Light-dependent Resistor (LDR) provided in the module.

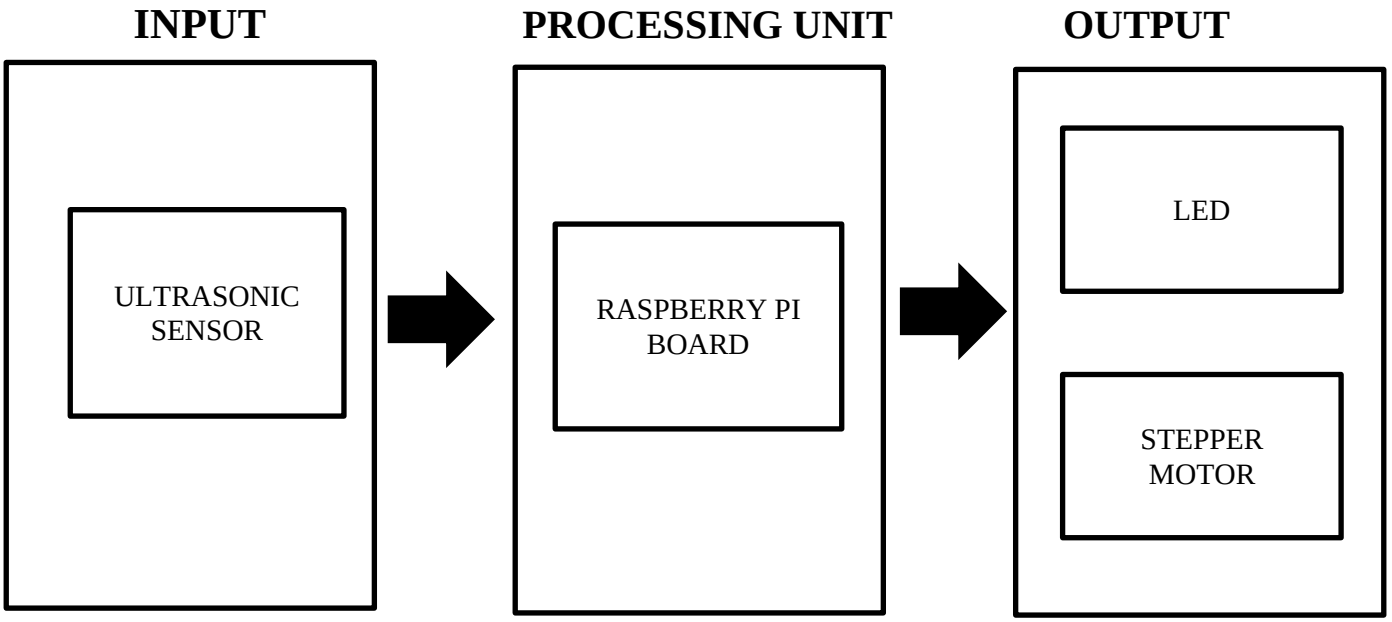
4.5 Wi-Fi Adapter

Figure 4.5: Wi-fi adapter

It is a WLAN USB dongle. The function of this adapter is to connect Raspberry Pi with Wide Local Area Network (WLAN).

Chapter 5

FLOWCHART



Chapter 6

CONCLUSION AND FUTURE WORK

Smart water meter with water quality monitoring is presented. The proposed system is created with the use of different sensors, Raspberry Pi as controller and Cloud for storing the data from Raspberry Pi and sending the command to raspberry PI for measuring water quality and controlling water distribution. The generated data can be viewed using web interface all over the world. The advantage of the system is to provide the adequate water supply with pressure and good quality water to every house, industry, and others. The proposed model can be implemented as a part of the smart city. On the basis of comparative of system used for Water Management System for Smart City Using IoT, our system is efficient in term of cost, accuracy, time and it require less man-power.

This has been done purely for ease of identification of the individual households, as analysis of the data gathered plays a pivotal role in the proposed model. It becomes essential therefore to pinpoint every holding and regulate the supply accordingly. The scalability of the proposed model in its current form is limited only by the organization of the cities household. The same may however be implemented on any scale, small or big, provided a proper distinction can be made between individual houses to enable the analysis to be based on that identity. Another novelty of the proposed model is its flexibility. The same model can be used for farmland water management, wherein the identification of every household would be replaced by individual farm plots. The analytics can be appropriately tuned without major changes.

CHAPTER 7

FUTURE WORK

In the current paper, as already mentioned, simplifying assumptions have been made about the layout and plan of the city where it can be implemented. This has been done purely for ease of identification of the individual households, as analysis of the data gathered plays a pivotal role in the proposed model. It becomes essential therefore to pinpoint every holding and regulate the supply accordingly. The scalability of the proposed model in its current form is limited only by the organization of the cities household. The same may however be implemented on any scale, small or big, provided a proper distinction can be made between individual houses to enable the analysis to be based on that identity. Another novelty of the proposed model is its flexibility. The same model can be used for farmland water management, wherein the identification of every household would be replaced by individual farm plots. The analytics can be appropriately tuned without major changes.

CHAPTER 8

APPENDIX

CHAPTER 8.1

PSEDOCODE