Automated Road Plant Soil Moisture level Identification and Irrigation using ESP8266 and Data Analytics

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Abstract
The "Automated Road plant soil moisture level identification and irrigation using esp8266 and data analytics" a sustainable solution towards care of plants on roads.
With the used of esp8266 module along with data analytics provide a solution towards wastage of water while watering of plants on roads by tankers and spilling of mud on roads in that process causing increase in chances of accidents. Using moisture sensors to accurately measure water content of soil and supplying of water when required along with effective tracking of water supplied for irrigation. Providing a effective water usage analytics and automated irrigation saving water and manual labor and efforts while maintaining roadside greeneryandsupportingvegetation

Keywords: esp8266, automated irrigation, water usage analytics, water saving, moisture sensors

Introduction

Current methods of irrigation and watering of plants in the road's dividers include provision of water using water-tankers, in this method lot of manual labor is involved, spilling of mud on roads while watering of plants leading to increasing chances of accidents along with that it comes out to be very inefficient method. Authorities allocate people with water tankers having sprayers are sent to location of plants present on dividers of roads. In this method the frequency of supply of water is important as plants require an adequate amount water in irrigation provides a better used for irrigation, providing a better solution for the whole process saving costs of watering plants water to grow and sustain themselves but they receive water in not specified manner as a result they wear out, also amount of water remains uncalculated, along with it usage of fuel for tanker to reach at specific locations is addon required cost for it. Automated Road plant soil moisture level identification and irrigation using esp8266 and data analytics, proposes a solution for the whole process of irrigation and sustaining of plants present on dividers of roads. By using moisture sensors for detection of water content of soil and supplying of water when required helps in sustaining of plants maintaining moisture level of soil and monitoringofusageof understandingofwater

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manual labor and avoiding the chances of accidents by avoiding spilling of water on roads along with sustaining greenery in urban areas[23].

Literature Survey

A comprehensive literature survey was conducted to explore the existing research and developments in the field of Intelligent plant watering systems[11][16][17][18], with specific focus on addressing challenges associated with conventional methods of irrigation systems for plants[04]. The survey related to increasing concerns regarding improper watering and resource wastage. Studies looks into innovative solutions to optimize irrigation processes and improve plant health and minimizing environmental impact. One important area of research identified during literature review was integration of advanced sensor and controllers' systems for irrigation systems with monitoring soil moisture levels and precisely transport water wherever required maintain a substantial water level for optimum growth of plants. Also, literature review highlighted the drawbacks of manual labor involved in overall process of traditional irrigation methods. While addressing issues development of automated systems led to reductional of manual labor and human intervention and enhancing safety on road. Furthermore literature review also made into account the importance of real-time monitoring of plant care systems. Traditional systems lacked real-time monitoring of plants resource utilizations. Motivations for developing Automated Road plant soil moisture level identification and irrigation using esp8266 and data analytics based on cost saving, reduction of chances of accidents, resource saving,
optimization of processes. The identified gaps and challenges in traditional methods highlight significance of exploring innovative solutions to revolutionize plant care practices for enhanced agricultural productivity and sustainability.

Problem Statement

The current watering system of plants present on road dividers cause water wastage and improper distribution of water along with fuel burning and costs associated with is high. Traditional approach lacks in sustaining plants for longer run.

Objectives

- Saving costs associated with irrigation for vegetation roadside
- Providing better methods of sustaining plants
- Avoidance of water wastage
- Reducing of accidents by avoiding spilling of mud on roads during watering
- Better tracking of water used in irrigation

Research Methodology

The condition of existing road side plant watering system was not very suitable for wate conservation that led to finding of a better approach to delt with the problem. After discussions on better ways of handling things and reduce human efforts and errors the automated system for irrigation was chosen[1][2]. That included deciding of logic of

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working system, its hardware requirements and overall analysis of water utilized in overall process. That also included the comparison of water consumption by plants, amount of water supplied by existing methods, and overall water conservation made possible by the proposed system and also its analysis by using data analysis and visualization using modern techniques.

Calculations

- **Amount of water supplied**
  Volume of waterper unit time supplied
  = (Liter/sec) * (Seconds) Time for which motor is turned ON

Software Requirements

- Language: React JS, JavaScript, HTML, CSS, PHP
- Arduino IDE and supportive libraries
- VS Code
- Microsoft Notepad

Hardware Requirements

- ESP8266
- Water Pump
- LEDs
- Pipes
- Battery/ Power source
- Relay
- Water Source
- Moisture Sensors

Block Diagram

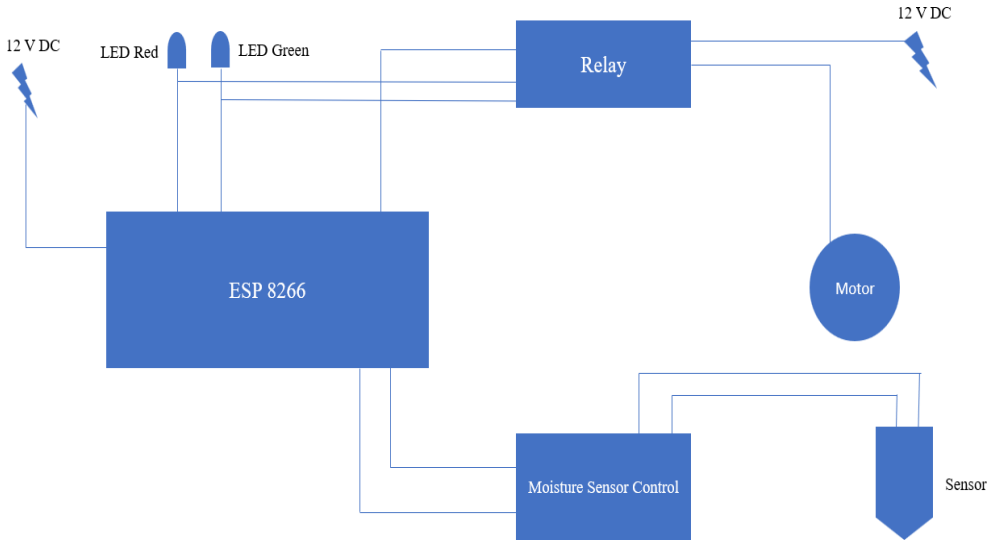

Fig. 1.1 Block Diagram

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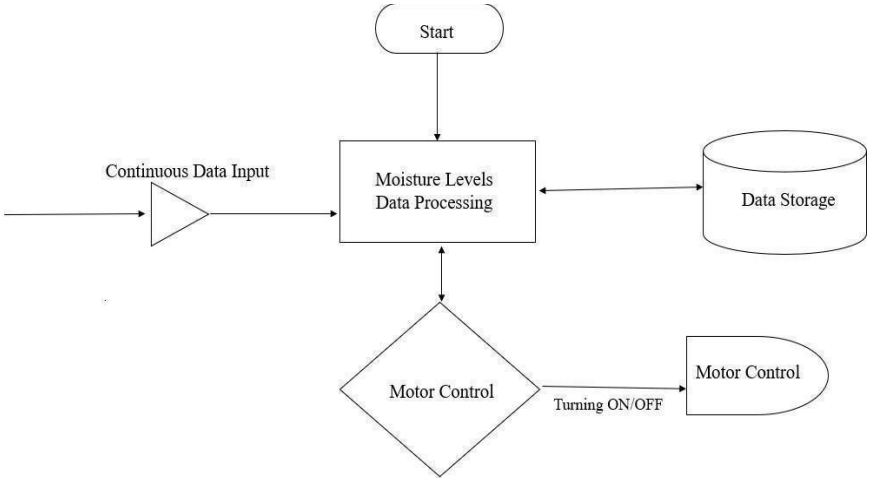
Workflow Diagram

Fig 1.2 Working of Automation in Watering System



Conclusion

In conclusion, "Automated Road plant soil moisture level identification and irrigation using esp8266 and data analytics" comes to be a effective solution to challenges posed by convectional irrigations system for road plants. The integration of advanced sensors and controllers addresses the issues imprecise watering, resource wastage and cost associated with it, providing a holistic approach to plant care. The system advantages, ranging from water conservation, accidents reduction to improved cleanliness and automation, understanding potential to sustain plants for longer time period[17][18]. The motivation behind its developments rooted to avoid irregular irrigation, water wastage, concerns regarding accidents due to mud on roads, costs associated with whole irrigation for plants and not monitoring water utilized for the whole process[12]. Automated Road plant soil moisture level identification and irrigation using esp8266 and data analytics emerges as solution for challenges faced in tradition methods of irrigation leading to sustainable growth of road plants for more greener roads[13].

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