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Crop Water Requirement Predication in Automated Drip Irrigation System Using IoT

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Abstract

The project "Crop Water Requirement Prediction in Automated Drip Irrigation System using IoT" aims to develop a system that optimizes water usage in agricultural irrigation by predicting crop water requirements. By employing IoT devices, sensors, and data analytics techniques, the system aims to enhance water efficiency, reduce water waste, and improve crop yield.The system utilizes soil moisture sensors to measure real-time soil moisture levels and collects weather data from external sources. These inputs are processed and analyzed using data analytics techniques to predict crop water requirements based on specific crop information and growth stages. An automated drip irrigation system, controlled by IoT devices, delivers water directly to the plant's root zones based on the predicted water requirements.The project's objectives include evaluating the accuracy of crop water requirement predictions, assessing water savings achieved compared to traditional irrigation methods, and monitoring crop health and yield. The collected data is analyzed to gain insights into irrigation strategies, weather conditions, and resource optimization. The user interface provides a convenient way for farmers to monitor and control the system, ensuring an asvaluable tool for enhancing driver safety.

INTRODUCTION

a good crop yield in a consistent manner.In India is an agricultural country and the majority of the population depends on it. Due to global warming and gradual depletion of natural resources, use of water resources should be done in an efficient and precise manner for farming. This paper proposes to automate the tedious process by proposing a micro-controller-based system for automatic smart drip irrigation and to predict the precise amount of water needed by the crop. Taking into consideration the weather, soil and crop parameters it will predict the quantity of water that should flow accordingly through drip irrigation with the help of sensors. This can control the moisture content of the soil in the cultivating field. Not only will it help the farmer to use water wisely in future but also the water supply to crops will be automated based on the conditions which is a win-win situation for both the farmer and the environment, leading to

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LITERATURE REVIEW

The rationale behind driver monitoring systems is to increase road safety by identifying and warning drivers of risky driving practices. Driver drowsiness is one such behavior that can be identified by keeping an eye on the driver's eyes. Eye detection methods have been the subject of several studies investigating driver monitoring systems. A driver drowsiness detection system that uses computer vision techniques to identify the driver's eyes and ascertain their status (open or closed) is presented in a study by Khurana et al. (2021). When the driver's eyes are closed for a predetermined amount of time, the system uses a machine learning algorithm to analyses the eye data and generate an alert. Yin et al.'s (2020) proposal for a driver monitoring system makes use of an infrared A driver monitoring system that uses an infrared camera to identify the driver's eyes and assess their health is suggested in another study by Yin et al. (2020). The system uses a convolutional neural network (CNN) algorithm to determine whether the driver's eyes are open or closed and to produce an alert when they are closed for a predetermined amount of time. Like this, a study by Ge et al. (2019) describes a system for detecting driver drowsiness that uses a camera to identify the driver's eyes and assess their condition. When the driver's eyes are closed for a predetermined amount of time, the system uses a deep learning algorithm to analyse the eye data and generate an alert.likewise, a study by Li et al. (2020) describes a driver behavior analysis system that employs a dashboard camera to record video data, a machine learning algorithm to analyze the data, and a detection system for unsafe driving behaviors, such as distraction.

METHODS AND MATERIALS

In this paper, Methods and materials for the project "Crop Water Requirement Prediction in Automated Drip Irrigation System using IoT" may include the following:Sensors: Use soil moisture sensors to measure the moisture content in the soil. These sensors can provide real-time data on soil moisture levels, which is essential for determining crop water requirements.Weather Data: Collect weather data such as temperature, humidity, wind speed, and solar radiation. This data can be obtained from weather stations or online weather APIs.

Crop Information: Gather information about the specific crop being cultivated, including its water requirements, growth stages, and optimal moisture levels.IoT Devices: Employ IoT devices such as microcontrollers (e.g., Arduino or Raspberry Pi) to interface with the sensors, collect data, and control the drip irrigation system. These devices can be programmed to communicate with the sensors and make decisions based on the collected data.These methods and materials provide a foundation for implementing the project, but specific details and technologies may vary based on the requirements, available resources, and desired outcomes of the project.

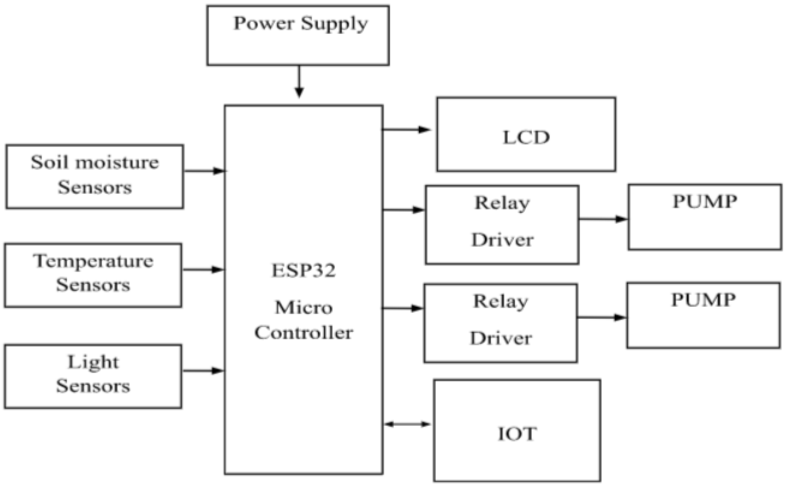

Figure 1 – Block Diagram of Crop water irrigation drip using IoT

The ESP32 microcontroller and is the brain of our project, it serves as the central processing unit, which receives data from various input devices such as the module, processes the data, and triggers the necessary actions to prevent any potential danger. The ESP32 is well-suited for IoT applications due to its built-in Wi-Fi and Bluetooth connectivity. This allows the microcontroller to connect to the internet and send data to remote servers or cloud-based platforms for further processing and analysis.
several pieces of hardware are necessary. Table 1, has been provided to detail the required components, including their quantities and cost in Indian Rupees. The cost for the system is quite low, at a total of 1400 rupees. Figure 2 displays required components for building LPG Leakage detection and disaster prevention system.

Table 1: Required Components, Quantity, and price

EQUIPMENT	QUANTITY	PRICE (INR)
Power Supply	1	200
Motor driver	1	150
ESP32 Microcontroller	1	380
16x2 LCD	1	199
Buzzer	1	20
DC Motor	1	55
		TOTAL: 1004

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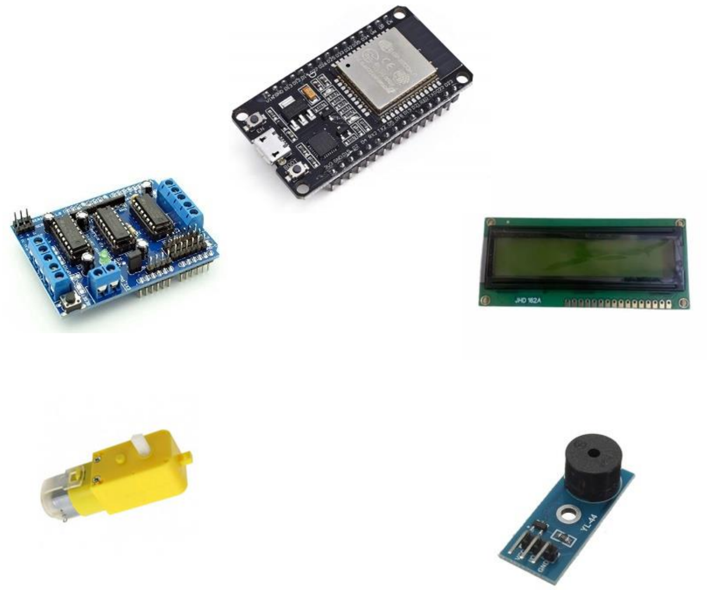

Figure 2 – Required Components for development

RESULT & ANALYSIS

The result of the project "Detection of unsafe driving and drivers' behaviour monitoring systemisfunctinalsystem The result and analysis of the project "Crop Water Requirement Prediction in Automated Drip Irrigation System using IoT" would involve evaluating the performance and effectiveness of the system in predicting crop water requirements and optimizing water usage. Here are some key aspects to consider for result and analysis:

Crop Water Requirement Prediction Accuracy: Assess the accuracy of the predicted crop water requirements compared to actual water requirements for different crop types and growth stages. Calculate metrics such as mean absolute error, root mean square error, or coefficient of determination to quantify the prediction performance.Water Savings: Measure the amount of water saved by using the automated drip irrigation system compared to traditional irrigation methods. Compare the water consumption of the system with the estimated crop water requirements to determine the efficiency of water usage.Scalability and Robustness: Assess the scalability and robustness of the system in handling larger agricultural areas, multiple crop types, and varying environmental conditions. Determine if the system can be easily adapted and replicated in different farming contexts.Cost-Benefit Analysis: Perform a cost-benefit analysis to evaluate the economic feasibility of implementing the automated drip irrigation system. Consider the costs associated with the IoT devices, sensors, installation, maintenance, and potential savings in water consumption and crop yield improvements.

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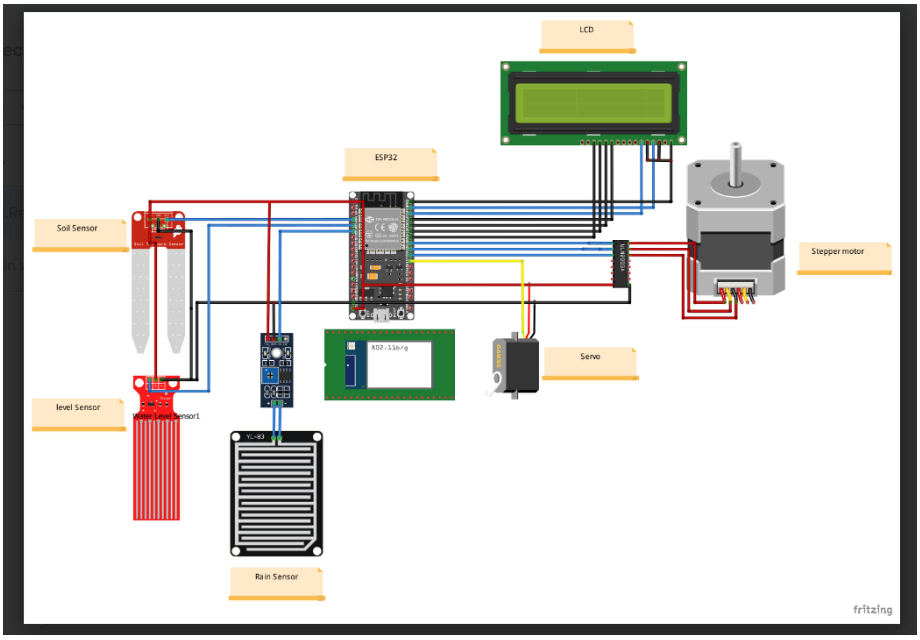

Figure 3 – Schematic Diagram designed using fritzing application

FUTURE WORK

Further developments and improvements on the Crop Water requirement prediction od drip using iot. The following are some potential future research areas: Integration of more sensors: Including more sensors, such as ones that can track a driver's heartbeat or brain activity, can give a more complete picture of that person's behaviour, and help the system identify more risky driving behaviours. Machine learning algorithm improvement: A more complex architecture or training on a larger, more varied dataset can both help the machine learning algorithm perform better. This could enhance the system's accuracy and dependability. And control. Additionally, the system could be expanded to include additional sensors for detecting multiple gases or other environmental conditions that could pose risks to occupants. Ultimately, the future capabilities of the LPG Gas leakage detection and prevention system are extensive, and new advancements will continue to emerge as technology progresses. Real-time driver coaching: The system can be upgraded to include a feature that gives the driver feedback on their driving style in real-time. This can assist the driver in developing safer driving practises and lowering the likelihood of collisions. Integration with vehicle control systems: Depending on the actions of the driver, the system can be integrated with the vehicle control systems to automatically change the speed or apply the brakes in an emergency. Integration with fleet management systems: The system is compatible with fleet management systems, allowing fleet managers to track the driving habits of their employees in real-time and take appropriate corrective action.Commercialization: The system may be improved and made available for purchase as either a stand-alone item or an integrated feature.

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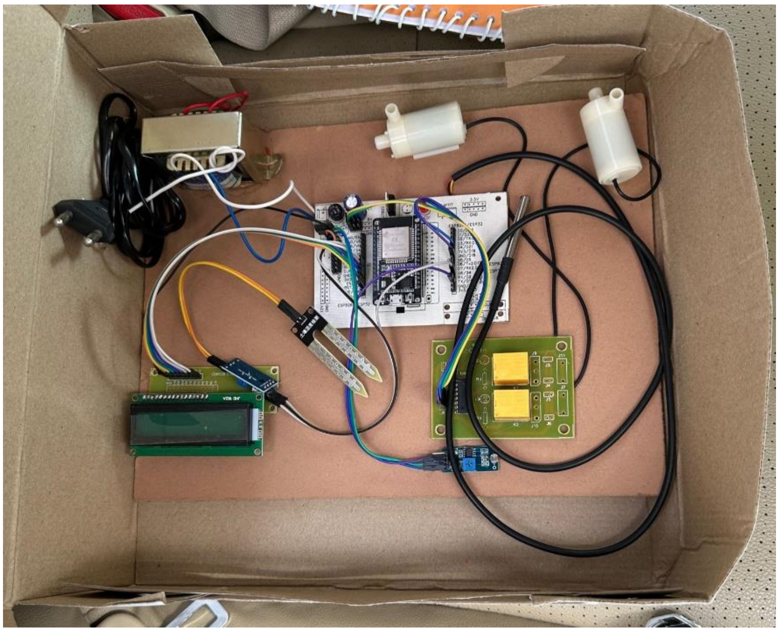
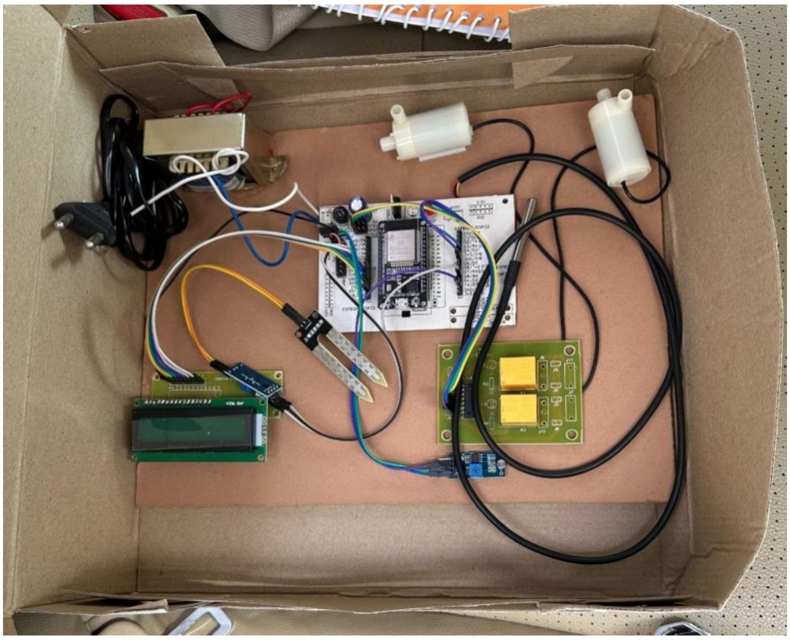
RESULT





CONCLUSION

This paper proposes and discusses the design of the project **"CROP WATER PREDICTION DRIP USING IOT"** has been successfully designed and tested. It has been developed by integrating features of all the hardware components used. The Detection of Unsafe Driving and Driver Monitoring System with Eye Detection Feature project is a promising application of computer vision and machine learning techniques to improve road safety by detecting and preventing unsafe driving behaviour. The system uses a camera and machine learning algorithms to analyse the driver's behaviour and detect patterns of unsafe driving, such as closed eyes or distracted driving. The system generates alerts in real-time to prevent accidents caused by unsafe driving behaviours.

The project was evaluated using a dataset of video data collected from different drivers in various driving conditions. The evaluation results showed that the system was able to detect the driver's eyes and generate alerts when the driver's eyes were closed for a certain duration. The machine learning algorithm achieved a high accuracy rate in detecting closed eyes and eyes not focused on the road. The project has the potential for future improvements and expansion, including the integration of additional sensors, real-time driver coaching, integration with vehicle control systems and fleet management systems, and commercialization.

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