Smart Road Side Divider Irrigation System

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Abstract:- Nature and technology plays a very vital role in our lives but sadly with the growing technology we are somehow harming our nature. Humans are well aware of the present scenario and are trying their best to balance this situation. Nowadays, in many places vertical gardens are implemented. The issues with these gardens is to maintain them and to use the resources aptly. Also it is not possible for a person to daily water these gardens manually.The solution to this can be provided through automation which will be helpful in multitasking.The proposed system is to maintain these gardens with apt utilisation of the resources through IOT technology. IOT Technology can be used for this proposed system as it is the new growing and emerging technology and is best suited for this proposed system.Efficient water management practices are crucial for sustainable urban development. The proposed smart cities roadside divider irrigation system incorporates advanced technologies such as Arduino microcontroller, GSM module, water pump, moisture sensor, temperature, and humidity sensor. The system is designed to optimise water use efficiency, reduce water wastage, and promote sustainable urban environments. The proposed system monitors soil moisture, temperature, and humidity levels, and adjusts the irrigation schedule based on these parameters. The irrigation system is controlled by the Arduino microcontroller, which is programmed to read

sensor data, control the water pump, and communicate with the GSM module. The GSM module enables remote monitoring and control of the irrigation system, providing real-time updates on irrigation schedules, soil moisture levels, and other critical parameters. The system has significant potential for improving urban water management practices and promoting sustainable and efficient urban development.The concept of smart cities is gaining momentum, and one area where technology and sustainability can be applied is in the management of roadside green spaces. A roadside divider irrigation system is an innovative and sustainable method of watering plants and greenery along the road divider using recycled water from nearby sources

Introduction:-

In recent years, the concept of smart cities has gained significant momentum as a means to address the challenges of urbanisation and improve the quality of life for citizens. One of the key elements of smart cities is the use of innovative technologies and sustainable practices to optimise resource utilisation and reduce environmental impact.One such area where smart city technologies can be applied is in the management of roadside green spaces. In many cities, these spaces are often neglected, resulting in degraded landscapes, reduced air quality, and increased urban heat island effects. To address these issues, the implementation of a roadside divider irrigation system can be a promising solution.A roadside divider irrigation system is an innovative and sustainable method of watering plants and greenery along the road divider using recycled water from nearby sources. The system can be designed to include sensors and monitoring systems that can detect moisture levels, temperature, and humidity, and automatically adjust the irrigation based on the weather conditions.

Literature review:

The concept of a roadside divider irrigation system has gained significant attention in recent years due to the need for sustainable and efficient urban water management practices. One approach to achieving this goal is through the use of smart irrigation systems that incorporate advanced technologies, such as IoT, wireless sensor networks, and machine learning algorithms.

One of the key advantages of smart irrigation systems is their ability to optimize water use efficiency and reduce water wastage. For example, the study by Thakur et al. (2018) proposes a smart irrigation system that uses IoT to monitor soil moisture, temperature, and humidity levels, and adjusts the irrigation schedule accordingly. The study by Das et al. (2018) proposes a similar system for agricultural fields, which uses IoT to monitor weather conditions, soil moisture, and crop growth, and adjusts the irrigation schedule basedon these parameters.

Other studies have focused on the use of wireless sensor networks (WSN) to monitor soil moisture and control irrigation systems. For example, Kar et al. (2018) propose a smart irrigation system that uses WSN to monitor soil moisture levels and transmit the data to a central controller, which adjusts the irrigation schedule based on the moisture levels. Similarly, Kim et al. (2019) propose a smart irrigation system that uses WSN to monitor soil moisture, temperature, and humidity levels, and adjusts the irrigation schedule accordingly.

In addition to optimising water use efficiency, smart irrigation systems can also improve crop yield and reduce maintenance costs. The study by Sarkar and Giri (2020) proposes a smart irrigation system for precision agriculture that uses IoT to monitor crop growth, soil moisture, and temperature levels, and adjusts the irrigation schedule accordingly. The system is designed to improve crop yield and reduce the need for manual irrigation and monitoring.

Machine learning algorithms can also be used to optimise smart irrigation systems. The study by Islam et al. (2021) proposes a smart irrigation system that uses machine learning algorithms to predict soil moisture levels and adjust the irrigation schedule accordingly. The system is designed to improve water use efficiency and reduce water wastage.

Overall, the literature suggests that smart irrigation systems, including roadside divider irrigation systems, have significant potential for improving urban water management practices. By incorporating advanced technologies and data analysis methods, these systems can optimise water use efficiency, reduce water wastage, and promote sustainable and efficient urban environments.

Methodology:

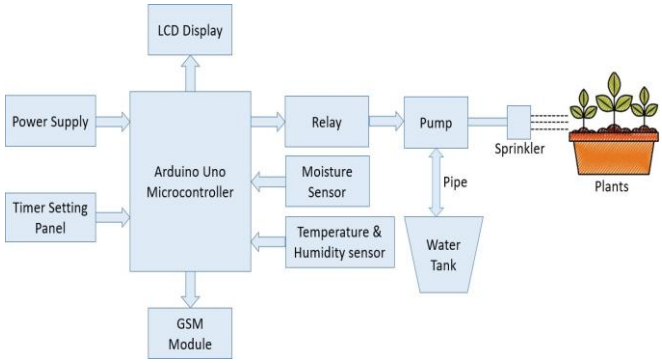

Fig: Block Diagram

Arduino microcontroller technology can be used to automate the smart roadside divider irrigation system. Arduino is an open-source hardware and software platform that can be programmed to control and monitor a variety of devices. It is easy to use, flexible, and low-cost, making it an ideal platform for small-scale automation projects.To automate the smart roadside divider irrigation system, an Arduino board can be used to read sensor data and control irrigation valves. The sensors can be connected to the Arduino board using analog or digital input pins. The sensor data can then be processed using programming logic to determine the irrigation schedule and control the irrigation valves. The irrigation valves can be controlled using digital output

pins.Here we designed a system with two modes of operation depending on client requirement. In first mode system operation depends upon moisture sensor output data. If the sensor gives data that soil moisture level is low to Arduino microcontroller then Arduino turns ON irrigation pump through relay driver and as soon as level becomes identical the irrigation pump will stop working. In the second mode of operation the system is controlled from a remote location using a mobile phone. In this mode a GSM module is used which makes a connection

with the admin mobile phone. If the admin wants to control the irrigation system he/she just gives on/off text SMS on the GSM module Sim-Card number. GSM modules continue to give output to the Arduino controller and as per admin selected requirement Arduino controls the irrigation pump

- **Water source:** This can be a nearby water treatment plant, a storm water management system, or a recycled water system.
- **Water treatment:** If necessary, the water may need to be treated to remove impurities or contaminants before being used for irrigation.
- **Pumping system:** A pumping system isused to transport the water from the

source to the irrigation system

- **Irrigation system:** The irrigation system includes the distribution pipes, sprinkler heads or drip emitters, and other necessary components to distribute the water evenlyacross the roadside divider.
- **Smart technology:** Sensors and monitoring systems are used to detect moisture levels, temperature, and humidity, and adjust irrigation based on weather conditions.

Control system: A control system is used

to manage the irrigation system and adjust the irrigation schedule based on the data received from the smart technology.

Requirement Analysis :-

Hardware Requirement:

- Water Pump
- Soil Moisture Sensor
- GSM Modem
- Relay
- LCD Display
- Temperature and Humidity Sensors
- Arduino Microcontroller Board

Software Requirements:

- Arduino Programming Software

Applications:

- A roadside divider irrigation system can be applied in urban areas to manage and maintain green spaces along roadsides, medians, and dividers. It can also be used in public parks, gardens, and other urban green spaces. This system can be customised based on the specific requirements of the project and the local environment.
- It can be implemented at home as it willconsume less space and give an excellent look with minimised hard work and maintenance.
- It is also useful for the industries, shops, malls as they all take care of both nature and technology, so this product is bestsuited for them.
- This can also be implemented on a large scale like flyover pillars, buildings etc

Future Scope:

The future scope of the roadside divider irrigation system is vast, and it can be further developed and customised based on the needs of different community. some capacity areas for future development consist of:

1. Integration with smart city infrastructure: The system can be integrated with other smart city infrastructure, such as weather monitoring systems, traffic management systems, and waste management systems, to create a comprehensive and interconnected smart city environment.

2. Use of renewable energy: The system can be powered by renewable energy sources, such as solar or wind power, to further reduce the environmental impact of the system.

3. Integration with other irrigation systems: The system can be integrated with other irrigation systems, such as rooftop gardens and urban farms, to create a more comprehensive and interconnected urban agriculture system.

4. Expansion to other urban areas: The system can be expanded to other urban areas, such as public parks, gardens, and other green spaces, to further promote sustainable urban development.

Conclusion:

A roadside divider irrigation system is an innovative and sustainable solution for managing green spaces in urban environments. By using recycled water and incorporating smart technology, this irrigation system can improve water use efficiency, reduce water wastage, and promote a healthier and more sustainable urban environment. The system offers a range of benefits, including water savings, efficient irrigation, reduced maintenance costs, environmental benefits, improved plant health, and enhanced aesthetic appeal.

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