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IOT Based Soil Monitoring and Automatic Irrigation System

***Chandrakesh Shukla , **Ashutosh Pathak , **Anubhav , **Ankit Meena**

*Project Guide, Dept. Of Electrical and Electronics Engineering, Maharaja Agrasen Institute Of Technology, New Delhi , India.

**Student, Dept. Of Electrical and Electronics Engineering, Maharaja Agrasen Institute Of Technology, New Delhi , India.

ABSTRACT -: Computrization of farmer work on Feild or farm activities can process agricultural domain from being manual and static to intelligent and dynamic leading to higher production with lesser human management.This paper proposes an automatic irrigation system that monitors and maintains the required soil wet content via automatic watering. Microcontroller ATMEGA328P on arduino uno platform is employed to implement the management unit.The setup uses soil wet sensors that live the precise wet level in soil. This worth allows the system to use acceptable amount of water that avoids over/under irrigation. IOT is utilized to remain the farmers updated regarding the standing of water sprinklers. data from the sensors is often updated on a webpage electronic equipment through that a farmer will check whether or not the water sprinklers ar ON/OFF at any given time. Also, the sensing element readings ar transmitted to a issue speak channel to get graphs for analysis.

1 INTRODUCTION

Agriculture is the unquestionably the largest livelihood provider in India. With rising population, there is a need for increased agricultural production. In order to support greater production in farms, the requirement of the amount of fresh water used in irrigation also rises. Currently, agriculture accounts 83% of the total water consumption in India.

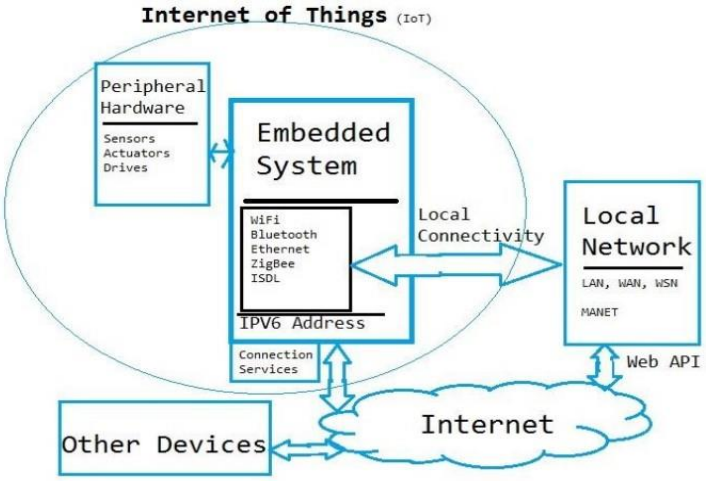
Unplanned use of water inadvertently results in wastage of water. This suggests that there is an urgent need to developsystems that prevent water wastage without imposing pressure on farmers. Over the past 15 years, farmers started using computers and software systems to organize their financial data and keep track of their transactions with third parties and also monitor their crops more effectively.

In the Internet era, where information plays a key role in people's lives, agriculture is rapidly becoming a very data intensive industry where farmers need to collect and evaluate a huge amount of information from a diverse number of devices (eg., sensors, faming machinery etc.) in order to become more efficient in production and communicating appropriate information.

With the advent of open source Arduino boards along with cheap moisture sensors, it is viable to create devices that can monitor the soil moisture content and accordingly irrigating the fields or the landscape as an when needed. The proposed system makes use of microcontroller ATMEGA328P on arduino uno platform and IOT which enable farmers to remotely monitor the status of sprinklers installed on the farm by knowing the sensor values thereby, making the farmers' work much easier as they can concentrate on other farm activities.

1.1 **Area of Utility -:** The primary focus of this project is to help the farmers and reduce their work.This module can be implemented in perennial plant irrigation land and gardening land.

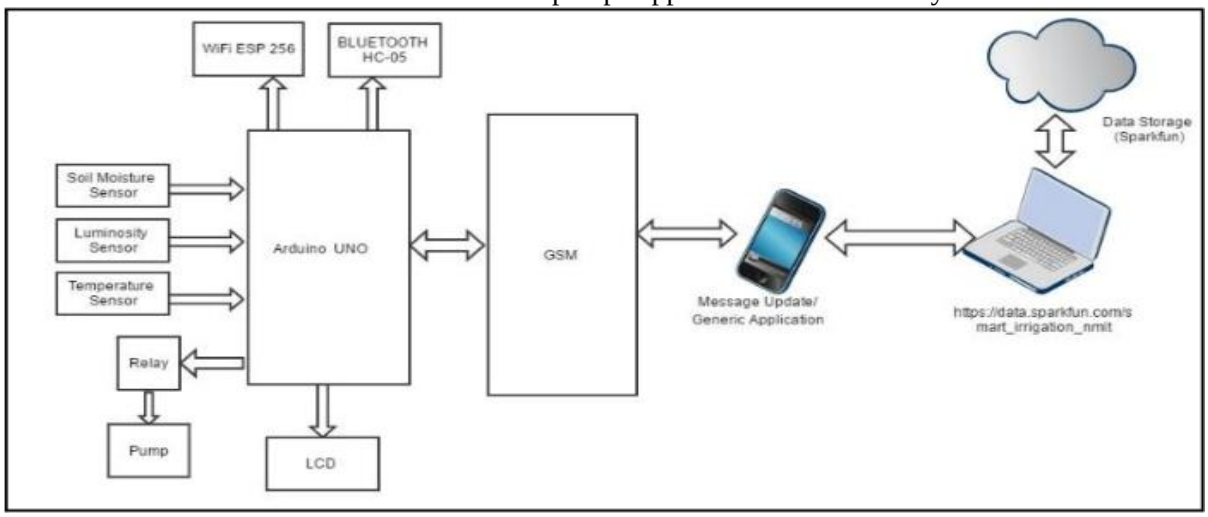
Basic of IoT -: The Internet of Things (IoT) is the interconnection of uniquely identifiable embedded computing devices within the existing Internet infrastructure. The "Internet of Things" connects devices and vehicles using electronic sensors and the Internet.



The Internet of Things (IoT) is the network of physical objects devices, vehicles, buildings and other items embedded with electronics, software, sensors, and network connectivity that enables these objects to collect and exchange data. The IoT allows objects to be sensed and controlled remotely across existing network infrastructure, creating opportunities for more direct integration of the physical world into computer based systems, and resulting in improved efficiency, accuracy and economic benefit, when IoT is augmented with sensors and actuators, the technology becomes an instance of the more general class of cyber physical systems, which also encompasses technologies such as smart grids, smart homes, intelligent transportation and smart cities. Each thing is uniquely identifiable through its embedded computing system but is able to interoperate within the existing Internet infrastructure.

2 WORKING

In this project, there are two functional components. These are soil moisture sensors and a water pump. Therefore, the Arduino board is programmed using Arduino IDE software. We use a moisture sensor to determine the soil moisture level. The water pump supplies water to the fied. This project uses Arduino Uno for controlling the water pump and soil moisture sensor. The motor can operate from 10 X 20. The soil moisture sensor measures the level of moisture in the soil, turns on the alarm, and sends a signal to the Arduino if soil moisture level is below the rated level and also arduino send ON/OFF notification to the mobile. The water pump supplies the field until they reach the desired moisture level.



2.1 **Connection -:** First all the connections are made between the ARDUINO UNO board, ESP8266 wifi module, L293D motor driver, YL38 soil sensor and the motor as per the connections given below.

Component 1	Pin	Pin Description		Pin	Pin Description	Component 2
Arduino Uno	A0	Analog Read	→	A0	Analog Data	YL – 38 Soil Moisture Sensor Module
	5V	Vcc		Vcc	-	
	GND	Ground		GND	Ground	
Arduino Uno	8	Digital I/O	→	A2	Input 2	L293D Motor Driver connected to Water Pump
	GND	Ground		A1	Input 1	
	5V	Vcc		ENA	Enable	
	GND	Ground		GND	Ground	
Arduino Uno	0 (Rx)	Receiver	→	Tx	Transmitter	ESP8266
	1 (Tx)	Transmitter		Rx	Receiver	
	3V3	3.3 V		Vcc	-	

1.We read data from the sensor using the function ‘analogRead (pin)’.

2.After that using the map function we enter the range of the sensor and the data.

3.We connect the ESP8266 Wi-Fi module to Arduino Uno board and create an instance of an object for serial communication using the function ‘SoftwareSerial(rxpin,txpin)’.

4.We then send AT commands to ESP8266 Wi-Fi module to check for available networks and access points using the function ‘sendAT’.Then using the function ‘connectwifi’ we connect to a local hotspot.

3 APPLICATION

1. Control the drip irrigation system in an automated fashion, but still, turn on individual zones manually when needed.
2. No reliance on the cloud should work over the local network.
3. Be extendable to any number of zones relatively easy.
4. Should work Autonomously by sensing soil moisture levels.Should be Inexpensive to build, but must be reliable.

4 ADVANTAGES

1. Automatic control system.
2. Empower farmers and producers to maximise yield, reduce disease and optimise resources.
3. Mobile based control system.
4. IoT sensors can measure soil temperature, soil water potential and soil Oxygen levels.
5. This project can be used vastly in the rural areas if Indian agricultural ministry gives quality emphasize on this project. Then it would be made possible for the agricultural officers to monitor the farms without going to the lands. For this the farmers will be so much benefitted & at the same time production rate can be increased.

5 LITERATURE REVIEW

In irrigation field, soil moisture sensor, temperature sensors are placed in root of plant and microcontroller handles the sensor information and transmits data. One algorithm was developed to measure threshold values of temperature sensor and soil moisture sensor that was programmed into a microcontroller to control water quantity.
A model of automatic irrigation system which is based on microcontroller and solar power was used only for source of power supply. Various sensor are placed in paddy field. Sensors sense water level continuously and give the information

to farmer through cellular phone. Farmer controls the motor using cellular phone without going in paddy field. If the water level reaches at danger level, automatically motor will be start.

6 FUTURE SCOPE

This project are often made further more innovative by adding -controlling and monitoring the sprinkles, checking the faults in the irrigation network and correcting them remotely and Watching the live working of integrated system in field area by pc/mobile. Also the longer term plan aspects of this model are always made into an intelligent system, where in the system predicts user actions, rainfall pattern, time to reap and much of more features which may make the system not to depend on human operation. All the system can be also updated to Real Time systems, such that users receive real time updates and standing of condition of the sector. Thereby, enabling the user to require immediate action just in case of any problems. By measuring variations within a field and adapting the strategy accordingly, farmers can greatly increase the effectiveness of pesticides and fertilizers and use them more selectively. Future the system can be included with more number of sensors like metal and sound sensors in order to make the agricultural field intrusion free. In future the same system can also be developed to sense the amount of nutrients required and to supply the same in correct quantities. A detailed study of effect of foliage surrounding plants on scattering of the wireless signals can be carried out so as to decrease the number of extra nodes.

7 CONCLUSION

The utilization of horticulture organizing innovation is need of the advanced rural improvement, yet additionally a significant image of things to come level of rural improvement; it will be the future heading of agrarian advancement. In the wake of building the rural water system framework equipment and breaking down and inquiring about the system chain of importance highlights, usefulness and the comparing programming design of accuracy agribusiness water system frameworks, really applying the web of things to the profoundly viable and safe rural creation significantly affects guaranteeing the effective utilization of water assets just as guaranteeing the productivity and strength of the horticultural generation. With greater headway in the field of IoT expected in the coming years, these frameworks can be increasingly productive, a lot quicker and less costly. In the Future, this framework can be made as a savvy framework, where in the framework predicts client activities, precipitation design, time to collect, creature interloper in the field and conveying the data through trend setting innovation like IoMT can be actualized with the goal that rural framework can be made free of human activity and thus quality and colossal amount yield can be acquired.

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