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IOT Based Savy Plant

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ABSTRACT: This paper presents an automatic watering system to provide water to the gardens based on moisture content conditions using an android application and ESP modules. Methods/statistical Analysis: Moisture Sensor continuously feeds values microcontroller. The sensor value is the displayed on the android app . Based on that, user can manually switch on the motor to water the plants . The moisture sensor continuously sends soil moisture reading at set time intervals . The status displayed on the mobile app is refreshed every 5 seconds. The values are displayed as lo, medium, high. Findings: Because of system's energy sovereignty, low cost and relatively more amounts of underground water saving, this system is preferable for house gardening purposes. This irrigation system has been working with high efficiency and top speed. By using this system, user can understand the soil conditions and control the system too manually.

Keywords: ATmega 328, Automatic Irrigation, ESP Module, Internet of Things, Node MCU, Soil Moisture Sensor.

I. INTRODUCTION

Agriculture has a major impact on economy of the country. Lot of Research been carried out in automating the irrigation system by employing wireless sensor and mobile computing. Recently "Machine to machine (M2M)" communication is an emerging technology which allows devices, objects etc to communicate among each other and send data to Server or Cloud through the Core Network. So accordingly we here have developed an Intelligent IOT based Automated Irrigation system where sensor data pertaining to soil moisture and temperature captured and accordingly motor and fan can be powered on or off based on the user inputs.

II. LITERATURE SURVEY

In the existing system of agriculture, the crops are being monitored with the help of ATMEGA boards and GSM technology where in Arduino boards acts as a microcontroller but not as a server. Hence in order to overcome all these features Atmega 328 microcontroller is being used with the Node MCU, which is latest version acts as both a microcontroller as well as server. Main feature of this methodology is its cheap cost for installation and multiple advantages. Here one can access as well as control the agriculture system in laptop, cell phone or a computer.

III. EXISTING SYSTEMS

Almost all existing solution to auto irrigation are meant for large scale implementation and farming. The systems available for these purpose are drip irrigation, sprinkler heads, centre pivot, lateral/linear move, etc.

Disadvantages of existing systems

- Wastage of water.
- Need of being physically present to start water supply.
- No way of knowing if water content in soil is under or over.

PROBLEM STATEMENT

The proposed paper aims to supply water whenever soil is dry or as desired without user being physically present and avoiding water wastage. We also monitor moisture level. It will also be possible to control the operation remotely from anywhere, anytime by mobile.

IV. PROPOSED SYSTEM

This smart agricultural model's main aim is to avoid water wastage in the irrigation process. It is low cost and efficient system. It includes Node MCU, ATMEGA 328, soil moisture sensors, relays.

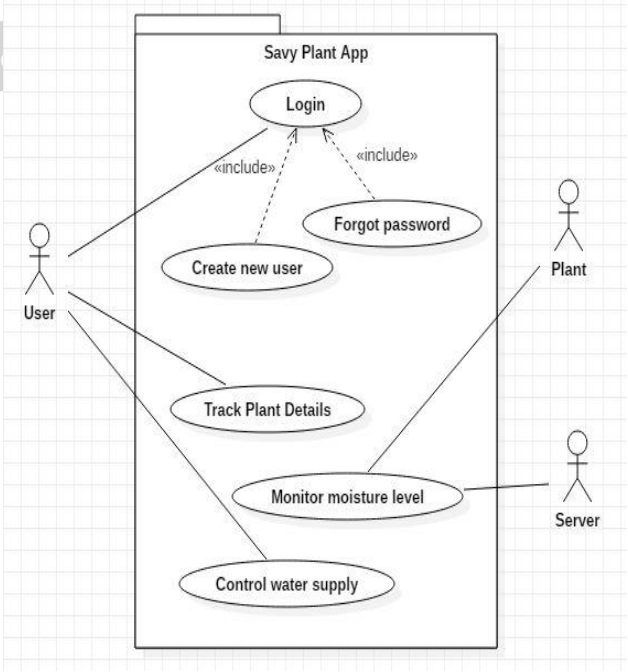

Fig:1 Use Case Diagram of system

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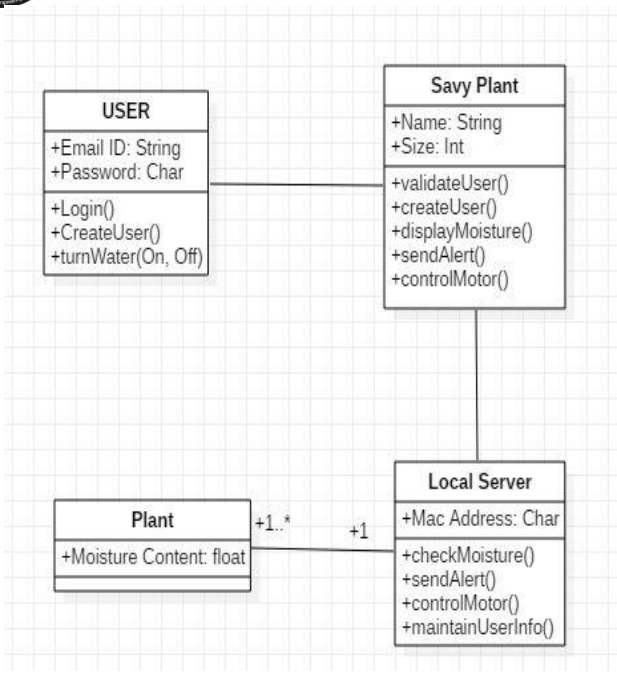

Fig:2 Class Diagram of system

NodeMCU: NodeMCU is an open source IoT platform. it includes firmware which runs on the ESP8266 Wi-Fi SoC from Expressive Systems, and hardware which is based on the ESP-12 module.

Fig:3 NodeMCU

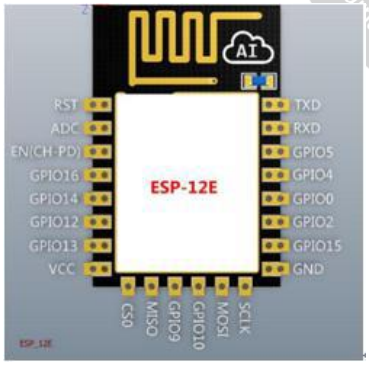

Fig:4 Esp 12 wifi module

ESP8266 is high integration wireless SOCs, designed for space and power constrained mobile platform designers. It provides unsurpassed ability to embed Wi-Fi capabilities within other systems, or to function as a standalone application, with the lowest cost, and minimal space requirement.

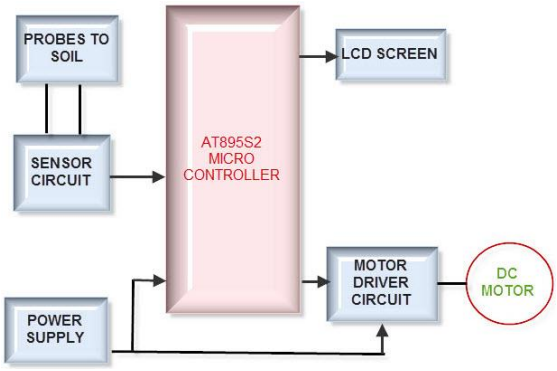

Fig:5 Block Diagram of Iot Based Savy Plant

We are going to design the automatic irrigation system for garden plants which will take decision of motor ON\OFF based on the moisture content. But decision of turning the motor ON/OFF will be taken by the user based on the moisture status inside the soil.

We are going to use ATMEGA 328 microcontroller as the main processing unit of the project. This microcontroller is having in built ADC. We are using soil moisture sensor in project to monitor the moisture in soil. Reading sensed by the sensor will be given to the microcontroller and it will analyze the amount of moisture based on the predefined threshold.

Those readings will be given to the online PHP scripts and moisture content will be sent to the owner and then owner can turn on or off the motor. Then that status will be fetched by the hardware device and it will turn on/off motor. The communication between the hardware and the user will be done over the internet. ESP 12 is the wifi module coordinating connections between the user and device.

Atmega 328 microcontroller: The high-performance Microchip 8-bit AVR RISC-based microcontroller combines 32KB ISP flash memory with read-while-write capabilities, 1KB EEPROM, 2KB SRAM, 23 general purpose I/O lines, 32 general purpose working registers, three flexible timer/counters with compare modes, internal and external interrupts,serial programmable USART, a byte-oriented 2-wire serial interface, SPI serial port, 6-channel 10-bit A/D converter (8-channels in TQFP and QFN/MLF packages), programmable watchdog timer with internal oscillator, and five software selectable power saving modes. The device operates between 1.8-5.5 volts.

By executing powerful instructions in a single clock cycle, the device achieves throughputs approaching 1 MIPS per MHz, balancing power consumption and processing speed.

Fig:6 ATmega 328

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Moisture sensor: The soil moisture sensor consists of two probes which are used to measure the volumetric content of water. The two probes allow the current to pass through the soil and then it gets the resistance value to measure the moisture value.

When there is more water, the soil will conduct more electricity which means that there will be less resistance. Therefore, the moisture level will be higher. Dry soil conducts electricity poorly, so when there will be less water, then the soil will conduct less electricity which means that there will be more resistance. Therefore, the moisture level will be lower.

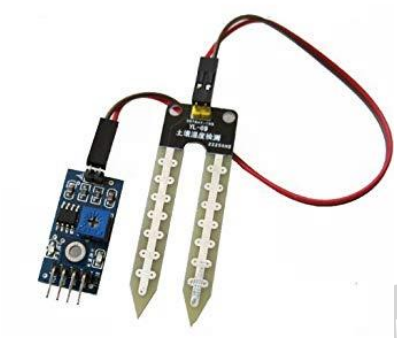

Fig:7 Soil Moisture sensor

Advantages of proposed system

- System is highly portable.
- Mobile app actively displays moisture content of the soil, better helping the user to decide when to give water to plants.
- User can turn on water supply from mobile phone, thereby eliminating need of physically being present to give water.
- Cost Efficient
- App can be used from anywhere in the world, therefore providing excellent range to user

V. EXPERIMENTAL RESULTS

This system helps us to monitor the moisture content of the soil. The sensor sends the data to the mobile app at regular intervals. The Status of the Moisture of the soil is displayed on the app as low and high, based on that, user can start water supply from anywhere in the world. For water supply, we have used a single motor which is connected via microcontroller and wifi module.

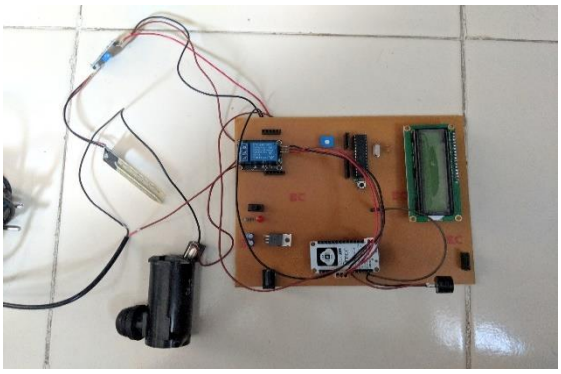

Fig:7 Hardware Setup

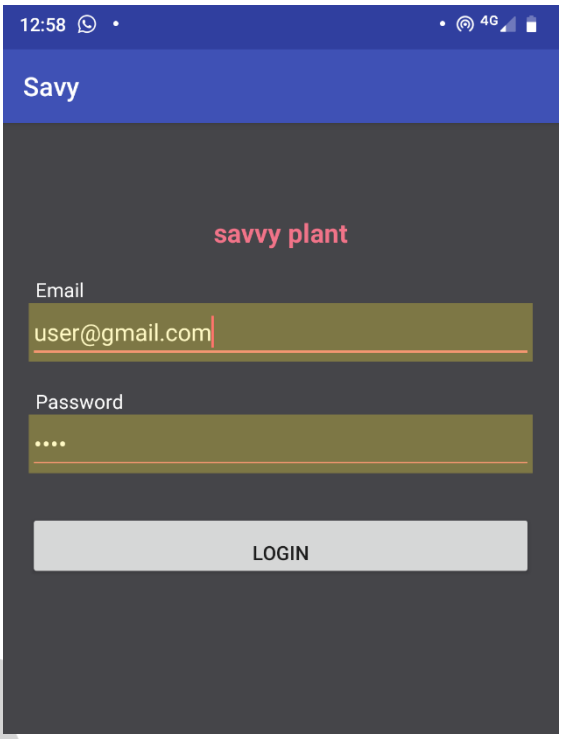

Fig: 8.1 Savy Plant App

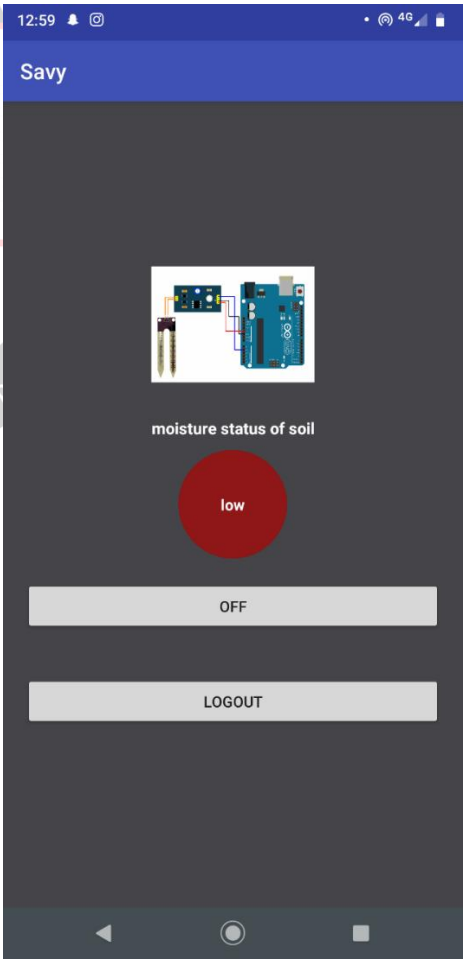

Fig: 8.2

As shown in fig. no 8 the moisture content is displayed using values sent by the moisture sensor. There is a button used to turn the motor on or off. This button also displays

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the status of the motor i.e on/off. User can logout after work is done

VI. CONCLUSION

During the implementation of this project , number of results have been studied based on the practical results obtained from the implemented systems.

The Designed system is cost efficient compared to other approaches.

The intent of designing Iot based Savy Plant is successfully accomplished and meets the desired objectives. The software and hardware components work efficiently to produce desired results. Use of this system helps user to better understand the status of the plants. The system does not require the user to be physically present to water the plants. Also the mobile App allows the user to use the system from anywhere in the world. The system is used to monitor the soil's moisture content and switch on/off the motor.

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