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Automated Mechanism to Start and put off Tube wells

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ABSTRACT: In today's era conservation of water is the most important topic to discuss on. It includes all the different ways we can save the water using the modern technologies available now. In India most of the water is consumed by the agriculture sector in watering the crops. Here more than the required amount of water is feed to the crops and thus a lot of amount of water is wasted.

In this paper we have implemented a system which can automatically turn ON and OFF the tube wells according to the requirement of the crops. Here we have used a soil moisture sensor which will detect the amount of moisture present in the soil and according to which the tube well will be turned ON/OFF. To make it more user friendly and reduce the manual effort we have also used IoT based system, with the help of which the user can also ON/OFF the tube well by using his smartphone from anywhere in the world.

Keywords: Automation, Wi-Fi, Soil Moisture sensor.

I. INTRODUCTION

Water is one of the world's most important natural resources. All forms of life, whether human, animal, plant, or aquatic, require water to survive. There would be no life on Earth if there was no water. The agriculture industry is the largest user of water, accounting for roughly 70% of total freshwater reserves. It is followed by industrial consumption (20%) and residential consumption (10%). While many farmers throughout the world rely on groundwater and other pumping supplies to water their crops, the environmental consequences of water waste are major concerns in agriculture. According to studies, around 40% of the freshwater used for agriculture is wasted due to evaporation, spills (overwatering), or deep penetration. Water management and consumption are essential for growth. [11] Agriculture in India contributes to 16% of the nation's GDP and 10% of export earnings. From this we can see that agriculture in India contributes to the economic development, and it is very important to optimise the yield by utilizing available science and technology. Traditional watering systems can waste up to 50% of the water used owing to inefficiencies in irrigation, evaporation, and overwatering. Smart irrigation systems employ sensors to collect real-time or historical data, which is then used to influence watering routines and change watering schedules to increase efficiency. [10] So therefore, the use of sensors in the agricultural fields for irrigation of crops helps to conserve the excess amount of water that was been used for watering the crops and the crops grown are healthy as they have got the required amount of water they needed for their growth.

II. LITERATURE SURVEY

Types of Smart Irrigation Systems

Control types (how the irrigation is regulated) and delivery types (the type of water delivery systems employed) are two significant features of smart irrigation. There are also two primary forms of control for smart irrigation systems: weather-based control and soil-based control, each with its own technological approach of detecting and giving information. [10]

1. Weather-based smart irrigation systems: These systems employ local weather information derived from reputable weather sources, sensors, or historical data to assist educated watering schedule decisions. A weather-based irrigation system is also known as an evapotranspiration, or ET, system, because it refers to the loss of water due to evaporation from the land and transpiration from plants. Water schedules are determined by analysing the combination of local temperature, humidity, insolation, and wind. [10]
2. Soil-based smart irrigation systems utilise the local soil moisture data from sensors which are inserted in the ground to assist them for smart watering schedule decisions. These systems may be designed to handle irrigation on demand, for example, beginning an irrigation process when a certain land area that is too dry, or stopping the irrigation when a certain sufficiency threshold is reached due to a soil moisture level being achieved. Managing these two key parameters decreases water use by connecting it to the moisture level required in the ground for a certain crop. [10]

Water Delivery in Smart Irrigation Systems

Precision watering in smart irrigation also addresses water delivery efficiency. There are four types of distribution methods: surface, sprinklers, trickling, and subterranean. [10]

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1. Surface irrigation is the most conventional approach, in which water is distributed through irrigation canals by gravity. [10]
2. Sprinklers, which can be permanent or movable, disperse water through the wind like rain. [10]
3. Trickling irrigation delivers water to the ground surface in a highly localised manner. [10]
4. Subterranean systems apply water below the earth and are installed adjacent to the plant's roots. [10]

III. BLOCK DIAGRAM

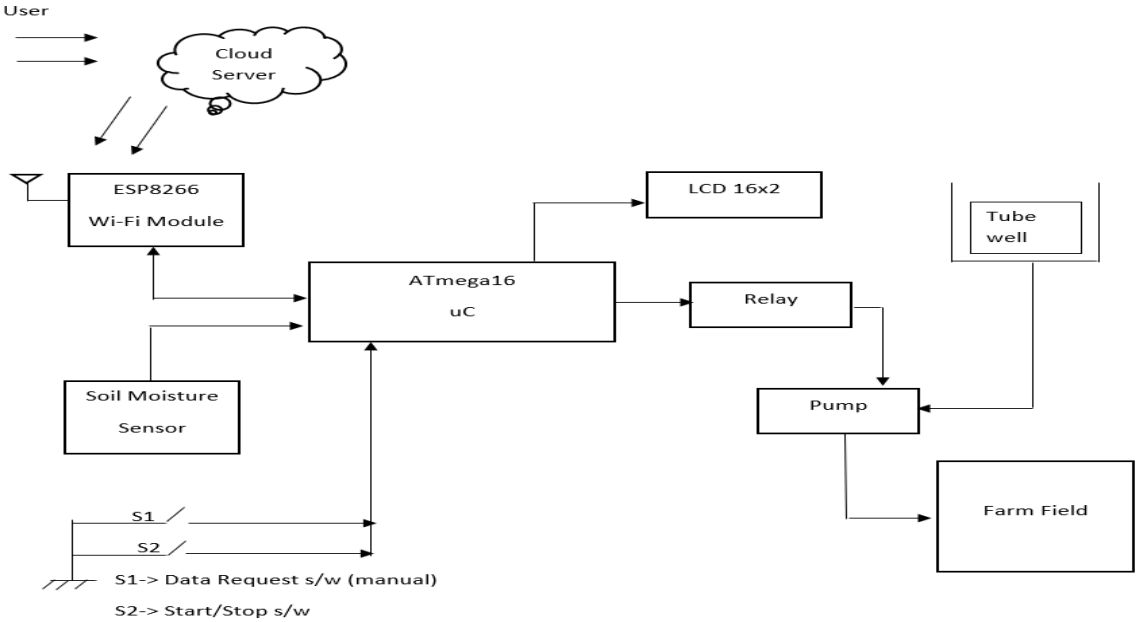

Fig.1. Block Diagram of Proposed System

Components

ATmega 16

It includes a sophisticated RISC (Reduced Instruction Set Computing) technology and an elevated microcontroller. This is the upgraded version of the 8051 microcontrollers, with features that outperform the 8051 microcontrollers. It's a system featuring a CPU, RAM, ROM, EEPROM, Timers, Counters, ADC, and four 8-bit ports labelled A, B, C, and D. For added performance, each port contains 8 input and output pins. [5]

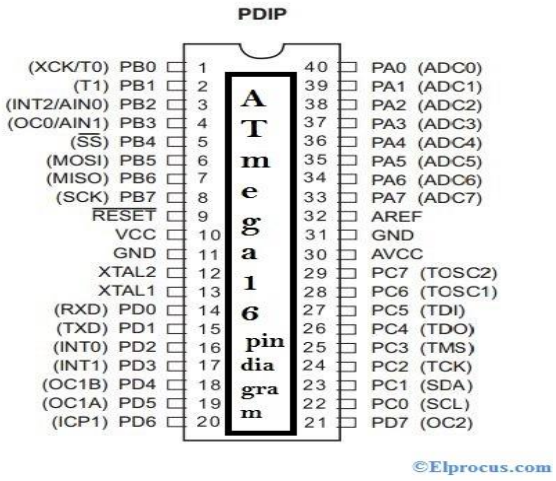

Fig.2. ATmega 16 [5]

ESP8266 (Wi-Fi Module)

Espressif's ESP8266 is a Wi-Fi-enabled system on chip (SoC) module. It is mostly used for the design of embedded IoT (Internet of Things) applications. The ESP8266 module is a low-cost independent wireless transceiver which can be used to develop end-point IoT applications. [7]

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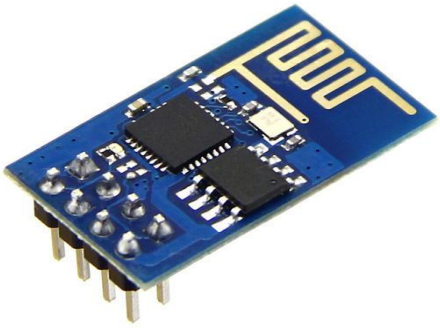

Fig.3. Wi-Fi Module [7]

Soil Moisture Sensor

It is used to determine the soil's water content. To learn about the soil state, current will be delivered through electrodes. When the soil is moist, the output voltage falls; when the soil is dry, the output voltage rises. [6]

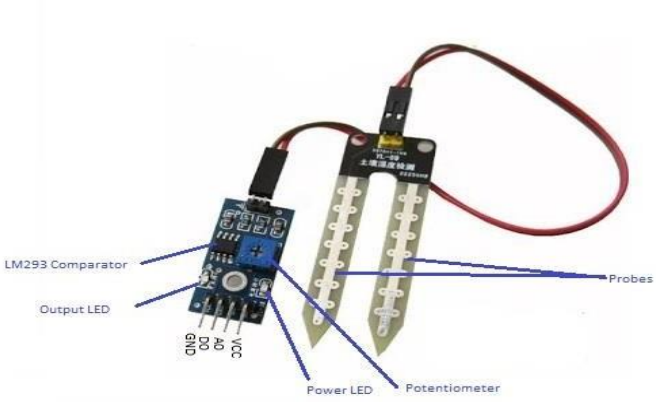

Fig.4. Soil Moisture Sensor [6]

LCD 16x2

LCD is an abbreviation for liquid crystal display. It is a type of electronic display module that is utilised in a wide variety of applications such as various circuits and devices such as mobile phones, calculators, computers, TV sets, and so on. [8]

Fig.5. 16x2 LCD Display [8]

Relay

In electronics, relays are the most often used switching device. It may be used in home automation projects to switch AC loads and in safety circuits to disconnect the load from the power supply in the case of a breakdown. [9]

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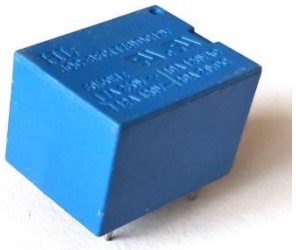

Fig.6. Relay [9]

IV. FLOW CHART

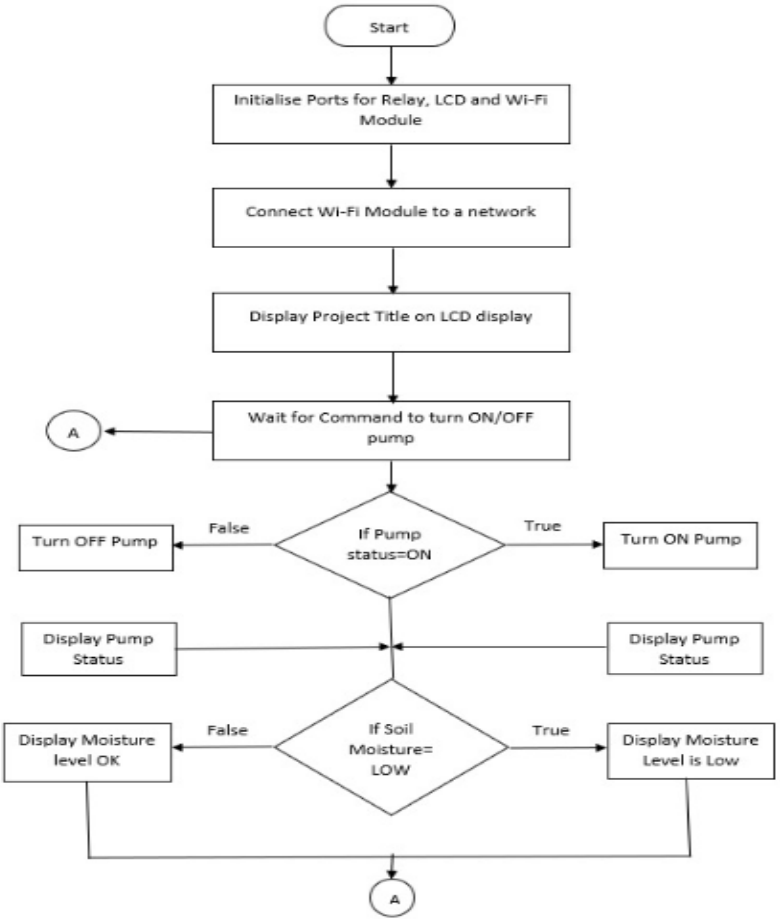

Fig.7. Flow Chart of Proposed System

V. IMPLEMENTATION

It is a Smart Irrigation Tool developed to assess the soil moisture present and according to which automatically starts and put off tube wells hence leading to conservation of water. A microcontroller is used to manage water delivery based on crop requirements. Watering requirements are detected in real time by embedded sensors installed in each field.

A simple system that allows the user to monitor and manage the distribution of water. It can work automatically or manually on the user's command using a mobile application from anywhere in the world. With the help of the soil moisture sensor, it detects whether the moisture is LOW or HIGH. The pump status (ON/OFF) and the soil moisture (LOW/HIGH) are displayed on the LCD.

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VI. RESULT

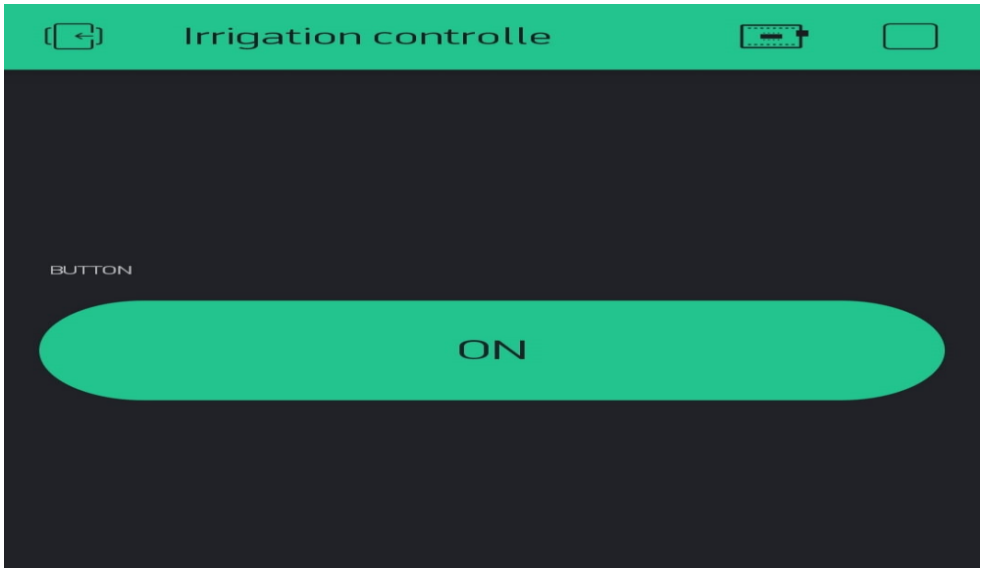

Fig.8. Mobile Application to turn ON/OFF

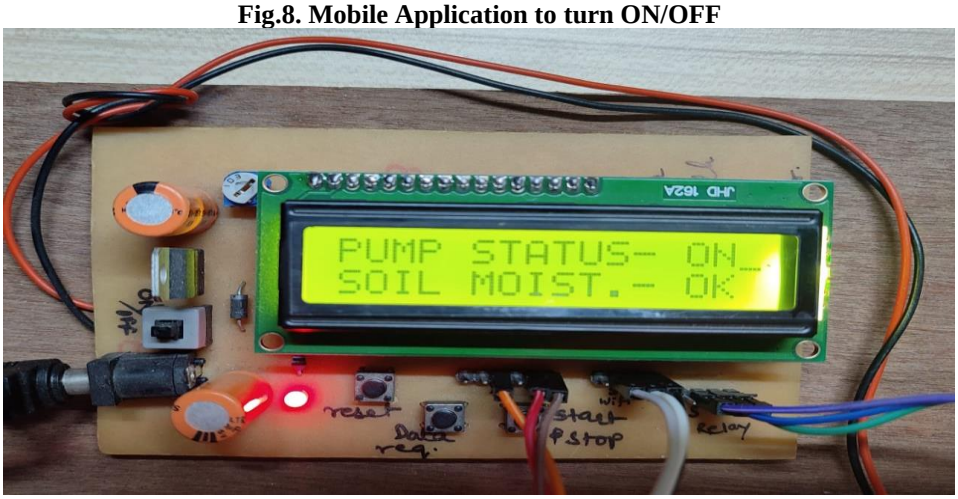

Fig.9. Current Status of Pump and Soil Moisture

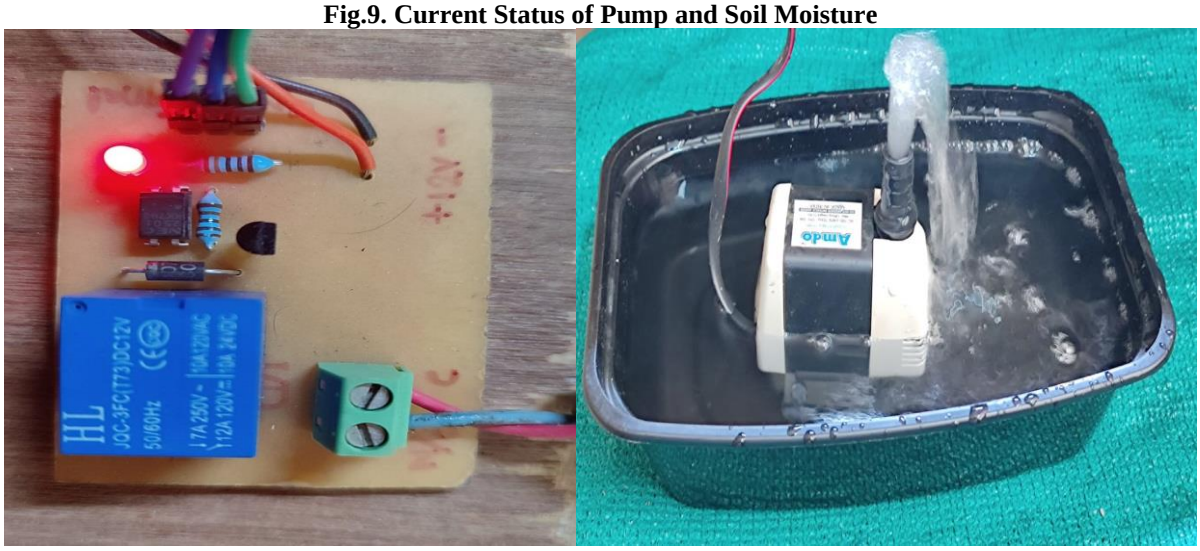

Fig.10. Pump getting Started

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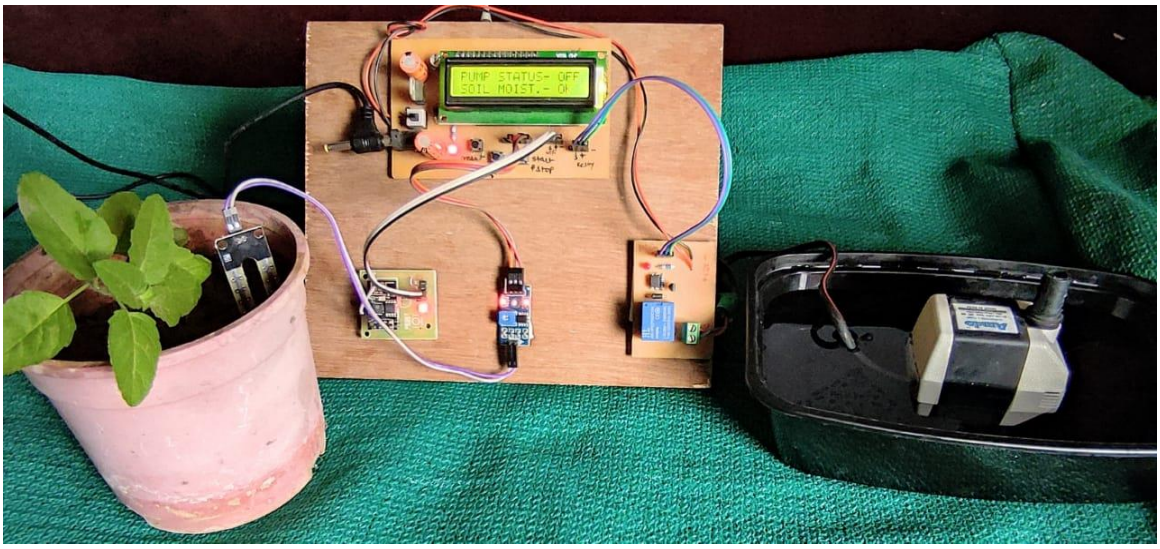

Fig.11.Hardware Implementation

VII. CONCLUSION

Here by using the smart irrigation system we can conserve the excess amount of water which is wasted by using the normal traditional methods for irrigation purpose. It a very user-friendly system and very easy to operate. It can be operated by using smartphones globally from anywhere in the world. It is also cost effective and easy to understand. It is also flexible to any future changes by using the future technologies.

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