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Automated Irrigation System for Agricultural Crop Field Monitoring using GSM Module and Wireless Network Sensors

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Abstract - *An automated irrigation system is developed to reduce the usage level of water and to reduce power loss in agricultural fields. The system describes about the monitoring of Indian agriculture and automated Irrigation system using GSM module and wireless network sensors. In this system we used Temperature sensor, Humidity sensor, soil moisture sensor to detect the soil condition automatically and LCD is used to display the status of motor. Temperature sensor and humidity sensor will continuously sense the information regarding the field. When the values are less than or greater than the threshold values it will do certain operations. Here the GSM technology is used for sending information to the farmer regarding status of motor on user request.*

***Key Words*: GSM, Sensors, Irrigation, Agriculture.**

1. INTRODUCTION

Agriculture sector is backbone for economy of many nations, however the cultivating techniques have seen no exceptional advancement with traditional cultivating strategies and choices taking the mainstream[1]. These strategies being not entirely dependable and reliable the lives of numerous farmers all through world are at a stake with karma being one of the significant factors in getting them great additions. The agrarian fields require water gracefully at standard interims, generally for excellent yields of food creation and the water will be provided to the homesteads from the close by engine pumps. These pump sets must be turned on and the water from this pump will be coordinated to the fields through the little channels and the engine must be turned off after the field is adequately wet. To do that, an individual must be utilized only to turn on the engine to flexibly water to the farms and switch off the engine after a specific measure of time. In the event that the individual can't go to the farm and switch on the engine on a specific day, the fields will be dry and the yield may not be a decent one. Today serious issues looked by the farmers are predominantly founded on irrigation[2] they should head out significant distances to arrive at their cultivating area to turn on engine to flood their property, during this procedure they are confronting numerous issues like snake chomps during evening times. Thus, here we have made a completely robotized water system framework where human intervention isn't required[3]. Farmers can likewise keep up water levels appropriately without having over water system or under water system. This paper is additionally utilized as a security framework for farmers.

To maintain a strategic distance from that and make the framework a totally mechanized one, a computerized flooded framework has been created to control the engine in order to provide the water to the farmers at a specific interim and further more to give the status data of the engine to the client. The farmer can sit at one present spot and screen the field. The framework depicts about the observing of Indian horticulture framework and robotized irrigation framework utilizing GSM module and remote sensor networks[4]. In this framework we are utilizing Temperature sensor, Humidity sensor, Soil moisture sensor to recognize the dirt condition consequently and LCD is utilized to show the status of the engine. Temperature sensor and stickiness sensor will constantly detect the data with respect to the field. At the point when the qualities are not exactly or more noteworthy than the limit esteems it will do certain activities. Here we are utilizing GSM innovation for sending data to the farmer with respect to the status of engine on client demand.

2. WORKING MODEL

2.1 Introduction to Architecture

The whole framework is actualized utilizing LPC2148 ARM Controller. Soil Moisture sensor, Humidity sensor, Temperature sensor and GSM Module. Mechanization of the movement framework is picking up significance as there is need to utilize water assets proficiently and furthermore to build the field profitability. The framework is utilized urn the valves ON or OFF naturally according to the water prerequisite of the

plants. The framework is utilized for detecting, observing, and for controlling reason.

In this proposed framework, Soil moisture sensor, Temperature and Humidity sensor will constantly detect the information and sends to ARM microcontroller[5]. The perusing of sensors got by the microcontroller and when the informationobtained from the sensors is least then limit of the edge esteem will take specific activities relying upon the worth. In the event that the farmer needs to know the status of homestead, the farmer can demand through GSM. The present status will be sent to the farmer.

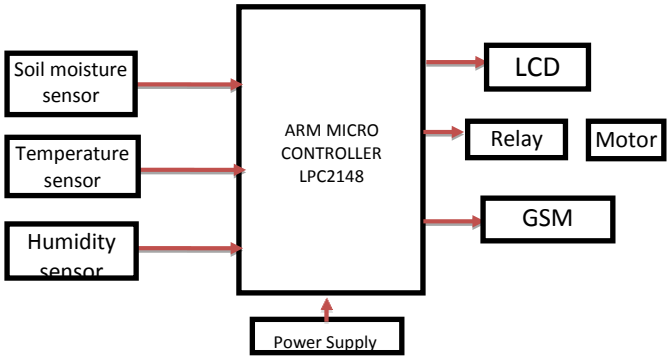

Fig-1: Block Diagram of Model

2.2 Power Supply

A Power supply is an electrical device that provides electric power to an electrical load. The essential capacity of a power supply is to change over electric current from a source to the right voltage, current and frequency to control the load. The term is most commonly applied to electrical energy supplies, less routinely to mechanical ones and once in a while to other fields. A power supply may include a power distribution system as well as primary or secondary sources of energy for example, conversion of one kind of electrical power to another ideal structure or voltage commonly including changing over AC line voltage to a general administered lower voltage DC for electronic devices. Low volage, low DC power supply units are reliably brought together with the devices they supply for example, PC's and household electronics.

2.3 Sensors

SOIL SENSOR:

Soil moisture sensor is a segment which is utilized to gauge the moisture substance of the soil[6]. It works on a 5 DC gracefully. It utilizes capacitance to quantify quantify the water substance of the dirt. It is utilized to to quantify the permittivity of the dirt, where permittivity is a component of water[7]. The dirt dampness sensor would comprise two cushions which which go about as a test. In the event that the water content in the dirt higher[8], than the conductivity between the tests will be bigger which will bring about about the lower opposition and subsequently it permits the ebb and flow to go through it.

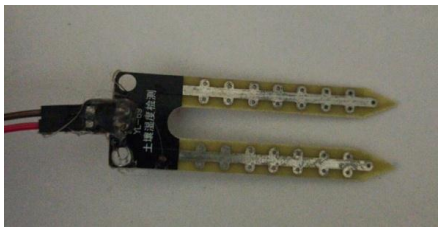

Fig 2: Soil Sensor

HUMIDITY SENSOR:

Humidity is the nearness of water in air. The measure of water fume in air can influence human solace just as many assembling process in ventures. In this paper we have utilized hrt393 moisture sensor [9] for detecting the humidity content and showing the stickiness in LCD screen.

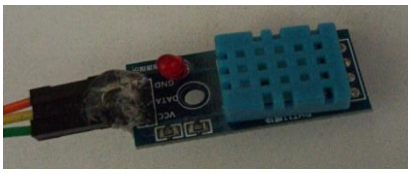

Fig 3: Humidity Sensor

TEMPERATURE SENSOR:

Temperature sensor is a part which is utilized to quantify the temperature substance of the soil [10]. The temperature sensor works at a voltage of 5v. The temperature sensor has a negative temperature coefficient of resistance [11]. The obstruction esteem goes down with increment in the temperature and the other way around. It is associated in arrangement with a reasonable biasing resistor to frame a potential divider organizer accordingly the adjustments in the dirt temperature [12] could be resolved.

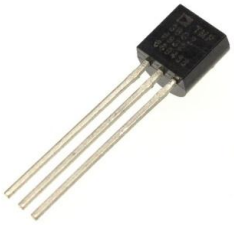

Fig 4: Temperature sensor

2.4 ARM Architecture

The ARM is a 32-bit Reduced Instruction Set Computer (RISC) guidance set design (ISA) created by ARM Limited. It was known as the Advanced RISC Machine,

and before that as the Acorn RISC Machine[13]. The ARM engineering is the most generally utilized 32-bit ISA as far as numbers delivered. They were initially imagined as a processor for work area PCs by Acorn Computers, a market currently commanded by the x 86 families by Intel and AMD. The general straightforwardness of ARM processors made them reasonable for low force applications. This has made them predominant in the portable and installed hardware advertises as moderately minimal effort and little microchips and miniaturized scale controllers. Starting at 2007, around 98 percent of the excess of a billion cell phones were sold every year at any rate one ARM processor. Starting at 2009, ARM processors represent around 90% of all implanted 32-bit RISC processors. ARM processors are utilized broadly in shopper hardware, including PDAs, cell phones, advanced media and music players, hand-held game consoles, adding machines and PC peripherals, for example, hard drives and switches. If it's not too much trouble note that ARM isn't a processor - it's a center plan by Acron. Acron Limited doesn't focus on assembling of processors with ARM center. They represent considerable authority in structuring of the CPU center.

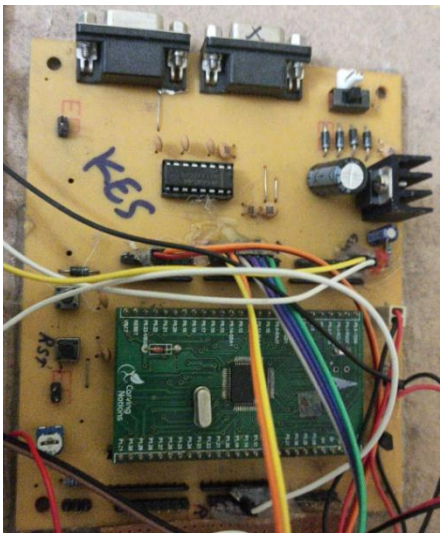

Fig 5: ARM 7 Microprocessor

2.5 Global System for Mobile Communication (GSM)

GSM, which represents Global System for Mobile interchanges, rules (significant) as the world's most generally utilized PDA innovation. Mobile phones utilize a PDA administration transporter's GSM arrange via looking for wireless towers in the close by territory. Worldwide framework for portable correspondence (GSM) is an internationally acknowledged standard for advanced cellular communication.

Fig 6: GSM Module

FEATURES OF GSM:
Its Spectrum proficiency is particularly improved. Worldwide wandering of calls is accessible. The Compatibility of GSM exists with ISDN (Integrated Services Digital Network). It additionally has an Alarm the executives with ongoing clock. It gets high caliber in discourse. It very well may be likewise utilized for making calls increasingly secure by utilizing encryption and giving SMS (Short Message Service).

GSM framework turned out to be most secure media transmission framework in view of the security systems normalized in it. This is a significant advance associated with building up start to finish association despite the fact that the classification of the call and mystery of GSM endorser.

3. RESULTS

This model was designed as a system low cost Automated Irrigation System using a Wireless Sensor Network[14] and GPRS Module, webpage based automation system for irrigation to reduce the manual monitoring of the field and get the information in the form of GPRS/GSM. The live parameters and status of devices can be monitored on the LCD available in the system

This paper shows a very efficient method for farmers to irrigate their field at a very minimal expense with the help of microprocessors and GSM. The sensors help the farmers in predicting the amount of irrigation required for their land. By leveraging this system, farmers can now irrigate their fields in the comfort of their homes. The framework of this system is not very complex which makes it easier to implement. This system also eradicates human intervention and hence prevents the wastage of resources. The ARM7 processor helps in obtaining improved and efficient results and GSM aids in the communication aspect. This

paper contributes significantly to the agricultural sector which is the backbone for the economy of many nations.

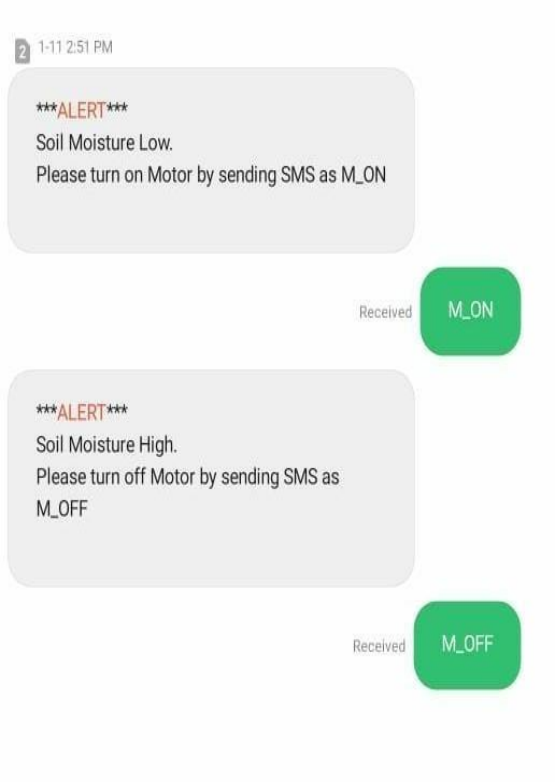

Fig 7: Screenshots at the user end.

4. CONCLUSION AND FUTURE SCOPE

In this model we prepared a prototype which monitors the farm using few sensors. The status of the farm will be known to the farmer from remote place also. We are controlling the water pump motor from remote place. So, we can reduce the human labor power and resources where we can prevent the wastage of resources. Regarding the microcontroller we have loaded the program into flash memory, where it will retain for at least 20 years. We can do changes to the program easily due to its instruction set. So ARM7 microcontroller is more efficient when compared to other microcontrollers. Using this system, one can save manpower, water also improve production and ultimately increase profit. This system was found to be feasible and cost effective for optimizing water resource for agriculture production. In civilian domain, this paper can be used to ensure faithful irrigation of farm field.

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