iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 9 **Issue:** VI **Month of publication:** June 2021

DOI: https://doi.org/10.22214/ijraset.2021.35819

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International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.429
Volume 9 Issue VI June 2021- Available at www.ijraset.com

GSM Based Automatic Irrigation System

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Abstract: ***Agriculture plays a significant part in India's food production development. Agriculture in our nation is reliant on the monsoons, which provide little water. As a result, irrigation is utilised in agriculture. Water is given to plants in an irrigation system based on the soil type. An automated irrigation system based on ARMs and a GSM module is presented in this article. The proposed system is a machine-based system that automates land irrigation by integrating multiple software and hardware techniques to locate precise field information and offer instantaneous watering across the area. Sensors, an LCD display, GSM, and an ARM7LPC2148 CPU are all included. The LCD will be used for field display. A Subscriber Identity Module (SIM) will be included in the GSM module, and users will be able to interact using this SIM number. When the user activates or gives a command, the appropriate sensor activates and reads the current reading, sending the data to the same user's mobile phone and displaying them on the field's LCD panel. If necessary, the user will immediately take the appropriate action. We're utilising sensors to keep track of the field's condition. Temperature and level sensors are what those are. The ARM CPU is linked to all of these devices. GSM is utilised for communication, and we may communicate with the components via AT (attention) commands. We use motors for level sensing applications.***
Keywords: Irrigation System, Soil Moisture, Sensor, Temperature Sensor, GSM

I. INTRODUCTION

Modern agriculture provides a variety of benefits to farmers, including increased output and revenue for small producers in both developed and developing nations. Agriculture is a key source of income for the majority of Indians and has a significant effect on the country's economy. Irrigation becomes difficult in arid places or when rainfall is insufficient. As a result, it must be mechanised for optimal yield and managed remotely to ensure farmer safety. The need for improved water management is highlighted by rising energy prices and dwindling water resources. Irrigation water management entails more than simply turning on the sprinklers. Irrigation management is a difficult decision-making process that involves determining when and how much water should be applied to a growing crop to meet specific management objectives. As a result, it has to be mechanised for maximum production and remotely monitored to assure farmer safety. Increasing energy prices and diminishing water supplies emphasise the need for better water management. Water management in irrigation includes more than just turning on the sprinklers. Irrigation management is a challenging decision-making process that entails choosing when and how much water to use water should be applied to a growing crop.

This project implements GSM technology's new uses. A generic GSM network is depicted in Figure 1. A control system that would function as an embedded system and monitor and control an agricultural motor and other devices locally utilising built-in input and output peripherals has been suggested using GSM networks. Controller and irrigation scheduler based on microclimate dataalso irrigation is real time application. These technique, irrigate using following technique.

1) Internet based Monitoring using Servers, GPRS modems, etc. with different approaches.
2) GSM-SMS protocols using GSM module individually or in combination with Internet Technologies.
3) Monitoring using Wireless Sensor Networks.
4) Wireless Monitoring using Bluetooth, Wi-Fi, Zigbee and GSM.
5) Applications have varied widely like Home Automation, Security Systems, Bio-medical applications, Agriculture, Environment, Reservoir, Bridge health monitoring, etc.

II. LITERATURE REVIEW

In this article, soil moisture sensors and temperature sensors are installed in the plant's root zone, and a gateway unit manages the sensor data and sends it to a web application. One method was created to detect temperature and soil moisture sensor threshold values, which was then put into a microcontroller to manage water quantity. A photovoltaic panel was utilised for power. Another facto like cellular-Internet interface used that allowed for data inspection and irrigation scheduling to be programmed through a web page.

The automatic system was tested for 136 days and save 90

In this study, an acoustic-based method for detecting soil moisture content was created. The primary goal of this methodology is to create a system for measuring soil moisture in real time. The method is based on a connection between two parameters, namely the speed of sound and the degree of saturation of soils with water. The speed of sound slows down when the moisture level rises, according to this experiment content following, depending on the kind of soil. [2]

This paper design 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

Without walking into the paddy field, you may make a phone call. If the water level reaches a dangerous level, the motor will automatically turn off without the farmer's consent. [4]. The automated system was built on ARM, and GSM technology was utilised for communication. The irrigation system ensures enough watering in a specific region in real time. In a paddy field, a soil moisture sensor is put in the root zone to detect water levels. The system was set up using ARM7TDMI core and GSM. GSM is an important part of these this system. System communicates using GSM. GSM operate through SMS and is a link between ARM processor and centralized unit. This system detects climate condition and field condition in real time. This information send to user in the form of SMS and GSM modem is controlled with the help of standard set of AT (Attention) commands. These commands are used to control majority of the functions of GSM model AT (Attention) commands. These commands are used to control majority of the functions of GSM model.[5]

The article used a wireless sensor network (Zig-bee) and internet technologies to irrigate utilising an automated irrigation approach. The concept was born out of a desire to enhance irrigation systems and lower irrigation water costs. Sensors are installed around the farm and collect data on a continual basis. This data is kept on the centre display, and it is also sent to the data collecting interface, where it is transcribed interface and then transmits to the wireless sensor node. Using this information system was control automatically using internet.[6]

III. OVERALL ANALYSIS

An automated irrigation system was utilised to irrigate a sage crop field for 136 days while saving 90 percent of the water. Irrigate with a cellular phone for autonomous irrigation systems, and use solar electricity as a power source [7]. Arm is also used to monitor the irrigation system in real time, and the irrigation system uses a GPRS system to water. [8].

Controlling an irrigation system with Zigbee and the internet thing[9]. Because the GPRS technology has several drawbacks, such as speed, distance factor, and dependability, it is not employed in our project. The low transmission rate of Zigbee is also a drawback. It's only good for short distances. The majority of articles include networking difficulties as well as security concerns. [10].

IV.PROPOSED WORK

The project's major goal is to offer water management in irrigation systems, as well as monitor and regulate factors in agriculture. However, because a vast number of devices lack a network interface, their data cannot be transferred via a network. A design for an integrated GSM interface based on an ARM7 CPU is described.

V. SYSTEM DESCRIPTION

The basic diagram of the contemporary agricultural system is shown in Figure 1. The settings in the block diagram will monitor the field and provide the user with correct findings. Level sensors to monitor soil condition are the most recent and significant additions. If it is dry this indicates that this situation is extremely hazardous to plants. As a result, instantly pour the water into the soil and moisten it. We'll utilise the level sensors for this. When it comes to weather forecasting, temperature and humidity are helpful. The LPC2148 microcontrollers are based on a 32-bit ARM7TDMI with real-time emulation and integrated trace support, combining a microcontroller with an embedded high-speed processor speed flash memory upto 512 kB. 32-bit code execution at the highest clock rate is possible because to a 128-bit wide memory interface and a unique accelerator design. LPC2148 are suitable for applications where downsizing is a major need, such as access control and point-of-sale, because to their small size and low power consumption. From a USB 2.0 to a serial communications interface, there are a variety of options These devices are ideally suited for communication gateways and protocol converters, soft modems, speech recognition, and low-end imaging, thanks to its full-speed device, multiple UARTs, SPI, SSP to I2C-bus, and on-chip SRAM of 8 kB to 40 kB. Single or dual 10-bit ADC(s), 10-bit DAC, and various 32-bit timers PWM channels and 45 fast GPIO lines with up to nine edge or level sensitive external interrupt pins make these microcontrollers suitable for industrial control and medical control.

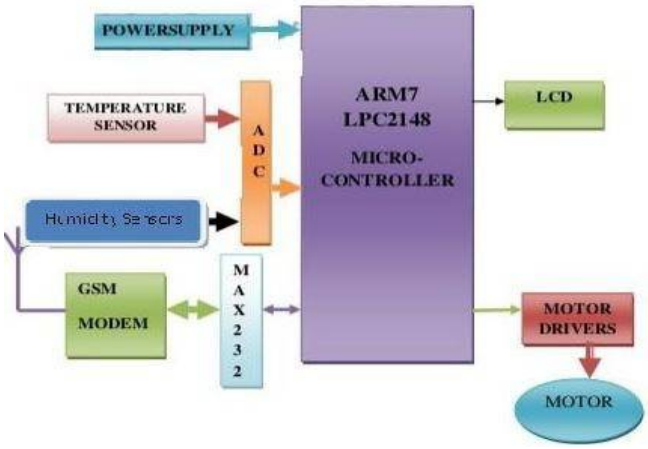

Figure 1: Block diagram of proposed system

A. Soil Moisture Sensor

In agriculture, measuring soil moisture is critical for farmers to manage their irrigation systems. One solution is a soil moisture sensor. This sensor determines the amount of water in a container. The capacitance of a soil moisture sensor is used to determine the amount of water in the soil. This sensor is simple to use. Simply place this tough sensor in the soil to be tested, and the volumetric water content will be determined of the soil is reported in percent.

Figure 2: Soil Moisture Sensor

B. DS18B20 Digital Thermometer

The DS18B20 Digital Thermometer measures temperature in 9 to 12bit centigrade and includes a nonvolatile alarm function with user-programmable upper and lower trigger points. The DS18B20 connects with a central CPU using a 1-Wire bus, which requires just one data line (and ground) by definition. It can operate at temperatures ranging from 55°C to +125°C and is accurate to 0.5C over the range of 10C to +85C. . Furthermore, the DS18B20 can get power directly from the data line (parasitic power), removing the need for an additional power supply.

Figure 3: DS18B20 Digital Thermometer

VI.CONCLUSION

The suggested concept is based entirely on the ARM-LPC2148 GSM Module. This initiative improved agricultural and increased food output while also providing superior water management. This can also help to boost the economy and meet the need for food.

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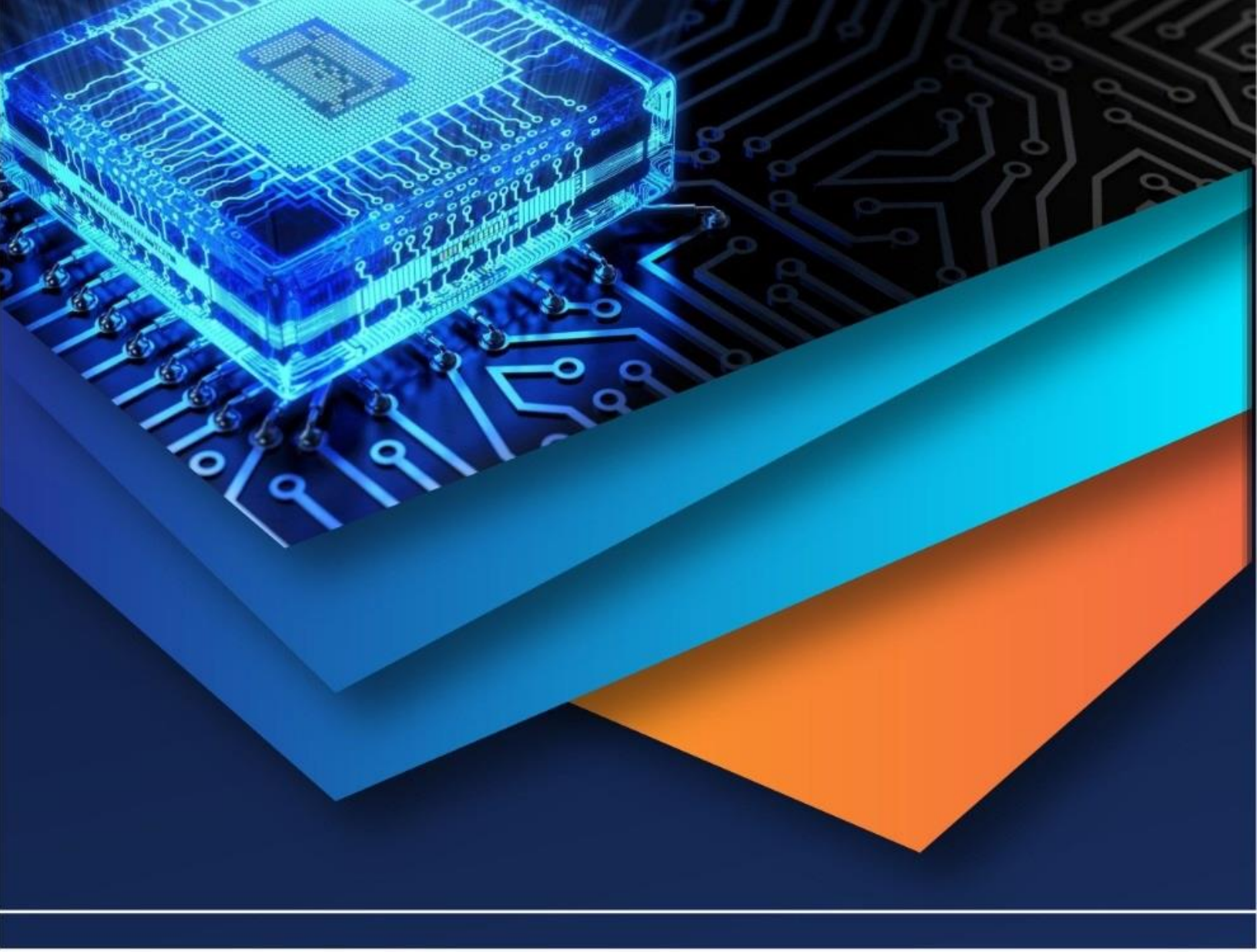

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