

Real Time Automation of Indian Agriculture

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Abstract: “Real time automation of Indian agricultural system” using AVR(Advanced Virtual RISC) microcontroller and GSM(Global System for Mobile) is focused on making the agriculture process easier with the help of automation. The set up consists of processor which is an 8-bit microcontroller. GSM plays an important part by controlling the irrigation on field. GSM is used to send and receive the data collected by the sensors to the farmer. GSM acts as a connecting bridge between AVR microcontroller and farmer. Our study aims to implement the basic application of automation of the irrigation field by programming the components and building the necessary hardware. In our study different type of sensors like LM35, humidity sensor, soil moisture sensor, IR sensor used to find the exact field condition. GSM is used to inform the farmer about the exact field condition so that he can carry necessary steps. AT(Attention) commands are used to control the functions like irrigation, ploughing, deploying seeds and carrying out other farming activities.

I. INTRODUCTION

Irrigation is a scientific process of artificially supplying water to the land or soil that is being cultivated. Traditionally in dry regions having no or little rainfall water had to be supplied to the fields either through canals or hand pumps, tube wells. But these method have severe problems such as increase in workload of farm labor and often it lead to problem such as over-irrigation or under-

The survey includes studying of six recent approaches of incorporating GSM technology and Bluetooth with mobile devices into a wireless adaption of the farm irrigation system.

A] “**The Real-time automation of Agricultural Environment for Social Modernization of Indian Agricultural System**” focuses on using an ARM7TDMI Core 32-bit microprocessor, GSM services which operate through SMS as a link between ARM processor and centralized unit. GSM is used to inform the user about exact field condition through a SMS on user request. The GSM model is controlled by a standard set of AT (Attention) commands.

The system continuously monitors the soil moisture, water level of the well, temperature, humidity, dew point, weather conditions and provides the details about the field to user though SMS. The system consists of a centralized unit having a subscriber number which forms a link

irrigation, and leaching of soil. Further there were issues like weeding, lesser yield of crop as an effect of above mentioned problems. Hence there was a need for a way to test the soil condition before supplying water to the fields. This mechanism would reduce the workload of the farmer and help maintain proper soil conditions for improved and better crop production. Hence with the use of advance technology it was possible to design systems that eliminated the direct involvement of the farmer with respect to irrigation of their fields.

A GSM based farm irrigation system has two major technologies behind it, primary being the “GSM” and secondary one is the controller or processor. GSM (Global System for Mobile Communication) is a standard set used to describe protocols for digital cellular networks. This GSM facility serves as an important part for controlling the irrigation on field and sending the results to the farmer using coded signals to a mobile device which indirectly controls the entire farm irrigation system. The processor or the controller works as a central core for functioning of the automated process after it has been initiated by the GSM based device and finally presents the output to the device. Now a day, a Bluetooth module is also interfaced with the processor/controller for simplifying the mobile device complications.

II. LITERATURE SURVEY

between user and device and acts as a primary node for sending and receiving the data though SMSs by the user. The centralized unit communicates with the system through SMSs which will be received by GSM module with the help of SIM card; the GSM sends this data to ARM7, after processing it displays it on the LCD. The activation command is given to start the motor and indirectly activate the transistorized relay circuit to constantly monitor the environmental factors and once the required level is reached the motor is turned off and the message is sent to the farmer.

B] “**Real time automation of Indian Agricultural System**” deals with ARM7 and GSM combined together for programming and developing the automated system. It is very much similar to the system presented in Real-time automation of Agricultural Environment for Social Modernization of Indian Agricultural System. In the system, soil moisture is measured using dielectric constant of soil and is informed to the centralized unit which sends a

message to the device which waits for a certain amount of default time for user response if no response is received it continuously monitors the field and keeps on sending the parameters to the centralized unit where it is stored in the EEPROM of ARM. Additionally, to monitor the plant or leaf's health, a leaf wetness sensor has been used allowing us to forecast disease and to protect plan canopy. It uses ARM7TDMI, 16kb RAM, flash memory, In-system programming with timers and serial interfaces and modems for creating the real time applications.

C] **“Innovative GSM Bluetooth Based Remote Controlled Embedded System for Irrigation proposes”** a system where GSM/Bluetooth based remote controlled embedded system is used for irrigation. The system sets the irrigation time depending on the environmental factors and can automatically irrigate the field. Information, regarding the status of power supply, is exchanged between the system using SMSs on GSM network. In addition to the GSM a Bluetooth facility has also been interfaced to the microcontroller for eliminating the SMS charges and the range limitations. The system checks for the water flow from the pump if no water supply is available system sends information to user via Bluetooth/SMS. The sensor information is sent to the farmer and the farmer sends data in the form of SMSs in the GSM network to start of stop the irrigation according to the received information. The system consists of an 8-bit PIC microcontroller having inbuilt ADCs and interface to various sensor, pump.

D] **“Integration of Wireless Technologies for Sustainable Agriculture”** proposes the system that eliminates the use of wired technology and improves the old method of collecting data and allows the farmer to control their sprinklers remotely. It utilizes wireless sensor networks to collect real time status of agricultural field and uses mobile phone to control the watering of the field using sprinkler. The wireless sensor nodes collect information regarding water level conditions and send the data to the central sink node which processes the information and sends it to the user's mobile phone and he accordingly controls the watering of the field using sprinkler controller. The nodes contain a sensor, radio transceivers, battery and interfacing circuit. The system proposes the use of sprinklers having two major features, pulsing (water application depth can be controlled by a series of on-off cycles) and nozzle orifice control (mechanically activated pin to alter the area which adjusts the sprinkler flow rate), controlled by the sprinkler controller which in turn has a GSM modem and a microcontroller. It uses a missed call instruction format wherein each number of missed calls is associated with a certain number of instructions to be performed, which is calculated by the microcontroller.

E] **“Design of Ultra Low Cost Cell Phone Based Embedded System for Irrigation”** uses AVR ATmega32 microcontroller and includes protection against single phasing, over current, over voltage, dry running and probable bearing faults; and alerts the user through missed calls/buzzers on completion of tasks. RTC DS1307 and DS18S20 are used for time and temperature measurement.

The system offers attractive features like automated control based on parameters specified though keyboard, SMS, number of missed calls in specified duration from user mobile though serial cable and based on the commands received and the present sensor conditions microcontroller system sends signal to the switch on-off the motor though starter using relay. Interfacing is done using RS232, AT commands is used. The SMS is a store and forward way of transmitting messages.

F] **“The Real-time automation of Agricultural”** using an AVR microcontroller, GSM services which operate through SMS as a link between GSM units. We are going to interface different sensors liketemperature, humidity, moisture, obstacle with AVR.

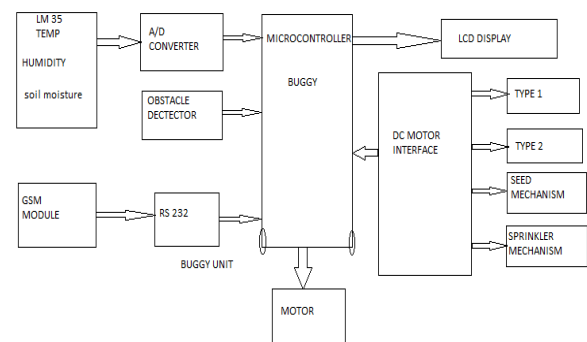
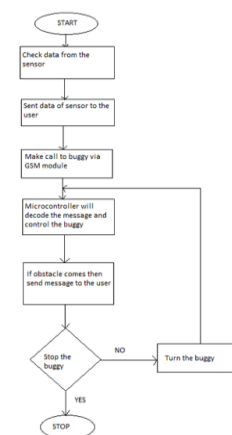


Fig. Block Diagram

GSM services which operate through SMS as a link between AVR microcontroller and GSM centralized unit. GSM is used to inform the user about exact field condition through a SMS on user request. The GSM model is controlled by a standard set of AT (Attention) commands.

We have also added seed and water mechanism itself in the robot and this mechanism can be controlled by user with the help of GSM module.

III. FLOWCHART



IV. ALGORITHM

STEP 1: Start

STEP 2: Check data from sensors.

STEP 3: Sent data of sensors to user.

STEP 4: Make a call to buggy via GSM module.

STEP 5: Decode and control buggy by wireless.

STEP 6: Control ploughing mechanism via mobile.

STEP 7: If obstacle detected then sent data to user.

STEP 8: Stop

V. ADVANTAGES

Advantages for the environment

- *Less CO₂ produced:-*
The emission of carbon dioxide can be controlled through this study. This can be beneficial.
- *Quality production:-*
The product quality will improve with the help of using proper techniques of farming.
- *Less labour work:-*
It can be operated by a single person with the help of GSM.
- *Health:-*
Farmer's health would not be affected by pesticides, insects and rays of sun.
- *Weather:-*
Farming would not be affected from any kind of weather.
- *More yield:-*
By using adequate amount of water, seeds, fertilizers and pesticides production will increase tremendously.
- *Less soil damage:-*
By using proper amount of pesticides the damage of soil can be controlled.

VI. CONCLUSION

There is an urgent need for a system that makes the agricultural process easier and burden free from the farmer's side. With the recent advancement of technology it has become necessary to increase the annual crop production output of our country India. The ability to conserve the natural resources as well as giving a splendid boost to the production of the crops is one of the main aims of incorporating such technology into the agricultural domain of the country. To save farmer's effort, water and time has been the most important consideration. Hence systems need to be designed to provide this ability efficiently using wireless sensor networking, sprinkler irrigation, GSM, SMS technology, Bluetooth technology

and readily available mobile phone devices is a certain help to the farmers to get better yield on a large scale and thereby increasing the agricultural wealth and the economic growth of our country.

In this paper we presented a summarized approach of various different types of irrigation systems based on GSM approach. The project is carried out using AVR microcontroller with the help of GSM technologies to ensure a faithful irrigation of the farm field. These systems were all remotely controlled systems which proposed a low cost information exchange via SMS and GSM network. The soil moisture, humidity and various other environmental factors influencing growth of crops are periodically sensed using high quality accurate sensor and those values are passed on to the processor/controller to calculate required amount of water and fertilizers and various other inputs during irrigation and accordingly supplied to the farm. The functionality of GSM increases the efficiency of the automated irrigation system by giving it a more user friendly interface using SMS (Short Message Service).

The result of the survey conducted has led to a very positive approach on the impact of GSM technology in farm irrigation methods and techniques. The approaches studied had various pros and cons in the time required for operations or complexity or feasibility and user interactions. With technology advancing everyday new techniques have been implemented for further minimizing the irrigation process like using prebuilt mobile phone or standalone application software for conduction the irrigation process.

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