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GSM Based Automatic Irrigation Control System

Aaryan M. Pardeshi [1], Shriniwas S. Dargad[2], Shubham S. Pisal[3], Prof. V. C. Bavkar[4]

Final year Student, Department of Electronics and Telecommunication Engineering, TSSM's BSCOER, Pune,

Maharashtra, India[1,2,3]

Professor, Department of Electronics and Telecommunication Engineering, TSSM's BSCOER, Pune,

Maharashtra, India [4]

ABSTRACT: In this paper, we describe about the monitoring of Indian agriculture using LPC2148.Monitoring of Indian agriculture is done using information of the temperature and humidity content. This is mainly used for saving water and monitoring agriculture without human presence. 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. We are using GSM technology also for sending information to the farmer. We have included two modes for monitoring manual and automatic mode. In manual mode farmer will be sending message and to monitor and control the water pump .In automatic mode farmer will not be involved to control the operations of motor .It will be operating the water pump motor automatically. So, that he can monitor from remote places also. As ARM7 processor is RISC architecture, it is so flexible to program and as advancements has increased in this field we have done code optimization for the program in this project.

KEYWORDS: LPC 2148, Soil Moisture, Temperature, Thingspeak

I.INTRODUCTION

In this paper we mainly discuss about monitoring of agriculture field without the presence of the human in the field. We require monitoring of agriculture these days because in this modern world as the technology has taken tremendous changes in many fields we are going to implement in the field of agriculture. As the time has playing key role we have introduced this system so that farmer can save some time and need not go to farm everytime. Now a days resources are getting drained so we should not waste them and use the existing resources carefully. So in order to avoid the wastage of water we have made an automatic control of water pump motor. So this project will help in protecting resources and saving time. In this project we does need a desktop to see the status of the farm. We have a LCD display to see the status of the farm and GSM modem is used to send message to farmer regarding the status of the farm. Farmer can know the information of the farm from the remote places also..For this project we have taken the LPC2148 microcontroller because it is a 64-bit RISC architecture. So that is can be easy to write the program with less instruction set and if we want to add any advancements we can add easily to them. We can have many other sensors required for farm to have advancements in the project. As the advancements regarding monitoring of agriculture using ARM7 are increasing we have tried for code optimization technique. So that by doing code optimization we can decrease the time and space complexity.

1.1 Problem Statement

In this proposed system, the sensors will continuously sense the data and sends to microcontroller. The information regarding temperature and humidity received by the microcontroller is displayed on LCD display in the farm. When the data received is minimum or maximum of the threshold value it will take particular actions depending on the value. The water level sensor senses the level of the water. When the water level is low it will send the message to the farmer that the water level is low using GSM. Then the farmer sends message(AT commands) to ON the motor. When the water reaches the maximum then water will turn off automatically. So that we can avoid wastage of water. We will be giving date and time when we start the system, so that during night time the light in the farm will automatically ON and when in the morning the light will automatically OFF. The date and time will also be displayed on the LCD screen. We are going to do the code optimization so that we can reduce the time and space complexity.

1.2 Objective

The design of the system involves both hardware and software. The hardware of the system will be placed in the farm and we require software for programming the hardware and loading the program in to flash memory.

II. RELATED WORK

Today, Agriculture plays very important role in country development. To make feasible for the farmer, the automatic monitoring system for maize farmland using different sensors, ARM Microcontroller etc., and transmit the farm information through SMS to the farmer using Global Positioning System (GPS). Wireless Sensor Network plays important task in monitoring physical, environmental conditions used in the agricultural field, military surveillance, industrial, consumer application, etc., In the agriculture field, wireless sensor network is used to monitor Temperature, Humidity, Soil moisture, Wind, Pressure, PH and Redox. By monitoring the corn growth continuously will achieve better yield with less manpower. If the canopy growth reaches its threshold value, then the information was displayed in the Liquid Crystal Display (LCD) and also send to the cultivator through mobile phone SMS for monitoring the canopy growth using LDR sensor with GSM [1].

Using wireless sensor network (WSN), the Leaf Area Index (LAI) was monitored continuously for measuring plant growth in forest by LAInet method and the information are shared using cloud computing [2]. The automatic irrigation system wills save-all the unique stages of plant growth and the message about plant growth are transferred through Zigbee module to the agriculturist [3]. Using Digital Image Processing, the unique stages of plant growth are taken as input image. Based on the captured image with its weather condition, the nutrition material is given to the plant for its better yield [4].

The INTELLIGENT HUMIDITY sensor will automatically monitor the soil moisture level in the farmland with reduced power consumption by collecting only less data which in turn cause more data to be lost in the system and there is no need to monitor and save the bulky data required in agricultural fields [5]. The different types of crops such as Paddy, banana, turmeric fields the canopy growth was monitored by a temperature sensor, humidity sensor, soil moisture sensor and the information about the farm are transmitted using a Zigbee module to the farmer and consume less power by using solar cells [6].

Using the Image Processing, the population of the corn plant count is measured automatically using a digital video camera on the vehicle moving in the distance of 1 to 2m/s. Based on this count, the fertilizers are given to the plant more approximately with avoiding insect attack [7]. In the proposed system, the Maize plant is continuously monitored by Temperature sensor, Humidity sensor, Water level sensor, PH sensor and finally the Soil Moisture sensor automatically and updates the information about crop growth to the agriculturist periodically through mobile phone SMS using Global Positioning System (GPS) for improving the quality of the maize with better yield by avoiding spraying of chemical substance in the farmland which in turn reduces the insect attack in the corn.
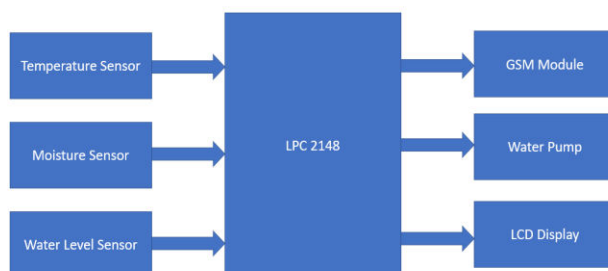
III. METHODOLOGY

Fig 1 Block Diagram

The hardware of the system contains the
- LPC2148(ARM microcontroller)
- GSM(Global System for Mobile communication)
- LM35(Temperature sensor)
- Humidity Sensor
- Water level sensor
- Switch
- Relay circuit

We need software for programming the device and make it run according to our needs.

1 Keil µvision IDE

Keil µVision is a free software which is mainly used for Embedded Systems. This Keil µVision is an integrated development environment (IDE), which combines the text editor/notepad for writing C language codes or Assembly language codes and a compiler which converts the source code to hexadecimal codes. We can also test the program without the hardware.

2 Flash Utility

For loading the program into the controller, we are using Philips Flash Utility Tool to load the hex codes to the ARM controller through UART port so that we cannot compile the code every time when we are running.

IV. ARCHITECTURE

The water level sensor ,soil moisture sensor, temperature, humidity sensor are connected to the ARM microcontroller. The temperature /humidity measured by the sensor is given to the farmer using GSM. We are using MAX232 for connecting the microcontroller and GSM. With the information coming from the soil moisture sensor it will make the motor pump automatically ON/OFF. When the water level reaches the adequate level ,water level sensor will send the information to the microcontroller and makes the water pump motor OFF. If the farmer wants to know the status of farm then farmer can request through GSM. The current status will be sent to the farmer. We have used Relay circuit to represent lamp which will automatically on/off according to the time given by the user. So we have used the real time clock to monitor this project.

V. IMPLEMENTATION

Initially power is giving continuously to the system so that the relay distribute the power to the respected devices in the system. After this, GSM is initialized by getting signal with delay. We have used a keyboard to give the input for microcontroller like date and time according to which the lamp will work. When we switch ON the system Temperature level, Humidity level, Water level and time will be displayed on the LCD screen. Depending upon the time, the lamp is ON in the night time and it will be OFF automatically in the day time. If the water level is LOW in the field, the farmer will get the message as water level is low including temperature level and humidity level and command to ON the motor. Once the farmer sends AT command as #ON then the motor will be ON. If the water reaches the maximum level, automatically motor will be OFF.

VI. FUTURE SCOPE

1) We can monitor the field through camera and can send as MMS to the farmer.
2) We can find the disease of the plant by placing the sensor at roots of the plants and can give suggestions regarding the fertilizers to the farmer.

VII. CONCLUSION

In this project we are monitoring 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 are reducing the human labour power and resources where we can prevent the wastage of resources Regarding the microcontroller we are loading the program

into flash memory, where it will retain for atleast 20 years. We can do changes to the program easily due to is its instruction set..So ARM7 microcontroller is more efficient when compared to other microcontrollers.

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The authors can acknowledge any person/authorities in this section. This is not mandatory.

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