



Remote Control and Automation of Agriculture Devices Using Android Technology

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Abstract: Remote control systems are a very useful way to control and monitor devices rapidly and effortlessly. This paper proposes a new architecture for remote control of agriculture devices and provides security to the farm through online-streaming. This paper proposes to develop a system that makes use of remote technologies to allow for remote access to the agricultural motor, pesticides thereby making a farmer's work much easier and less dependent of the conditions present. As outcome of this paper an Android application running on a smart phone, connected to the server via internet is build. This server can be controlled through a small java application written in Java.

Keywords: Wi-Fi, Zigbee, javac, Direct current[DC], GSM, SMS

I. INTRODUCTION

India is basically an agricultural nation, and most of its income depends on the agricultural productivity. With the speedy development of agriculture in India, many automatic technologies have been introduced into agricultural productions[4].

The total rainwater in a particular area may be either not enough, or badly timed[4]. In order to get the maximum profit, it is important to supply the best possible quantity of water, and maintain correct timing of water[4].

Remote control systems are a very useful element to control and monitor devices quickly and easily[2]. Although the area of remote control is currently very popular issue, it may provide important advantages for testing software and hardware developments in several real devices[1]. It can also allow professional management of various different type devices, perform security tasks etc[1].

The main idea behind the proposed architecture is to design a system, which would be used as a platform which provides the services needed to perform remote control of agricultural devices. The farmer should be able to on/off the motor, decide the pesticides proportion and monitor the farming activities remotely. Many times user misses their farming tasks because he/she is not able to remember all the activities and their correct timing on which it is necessary to perform that activity. This system should provide reminder to the user so that their farming activity will take place on time. If the user fails to give the stop command due to network failure, the java machine should be able to stop the motor automatically after specific time slot.

As outcome of this paper a proof of concept will be implemented an Android application for user to control the devices and same application on computer which works as a server.

II. NEED

Irrigation is an essential thing in many agricultural cropping systems in semiarid and dry areas and efficient water applications and management are major concerns. The central idea of this project is to develop low cost intelligent

remote monitoring system using mobile with emphasis on its utilization in rural areas.

The need of developing this project is basically to avoid the drawbacks of the existing system.

In order to get the maximum yield, it is essential to provide the optimum quantity of water, and maintain correct timing of water. This is possible only through a efficient irrigation system-by collecting water during the periods of Excess rainfall and releasing it to the crop as and when it is needed[4].

Traditional system have some disadvantages like Overhead of hardware, Less cost effective because of expensive hardware, do not have alert facilities, limited functions and facilities.

There are common incidences of burning of motor due to and dry running of motor. Repairing cost of pump and non-supply of water during motor failure period cause large reduction in yield of crop. For avoiding these drawbacks and for providing the additional functionalities we need to develop this project.

III. LITERATURE SURVEY

It is found that most of the research carried out in agriculture field belongs to the following categories:

- GSM-SMS protocols using GSM module independently or in grouping with internet Technologies[5].
- Monitoring using the Wireless technology such as Bluetooth, Zigbee, Wi-Fi[3] and Radio Frequency Devices.
- Monitoring using Wireless Sensor Networks[6].

A. Working of the existing system:

Now a day, the use of mobile phones for development of remote control application for the induction Motor-pump which is used in the agriculture for irrigation is increased. Due to frequent power cuts and abnormal voltage conditions in India, it is necessary to distribute water efficiently to the fields during normal conditions. This is carried out by exchanging the information between the user phone and GSM in the form of missed calls and messages[4]. This system is developed with Arduino Uno Microcontroller

which is connected to the GSM, sensors and the motor[4]. The temperature sensor is used to detect the temperature of the environment and capacitive sensor to sense the water flow in the pipe. The microcontroller includes the protection against over-current, dry running and single phasing. It is expected that this application provides easy access of motor to a great extent.

a. Short Messaging Service (SMS):

The remote user sends text messages or SMS[5] including commands to the receiver. GSM receiver receive messages sent from the user mobile phone. GSM receiver decodes the sent message and sends the commands to the microcontroller. Microcontroller gives commands to the devices connected i.e. the water pump motor will switch ON/OFF.

Following drawbacks are noticed in this system are as:

- Some illiterate farmers found difficulty in typing keywords for sending control SMS.
- Operational cost increases due to bidirectional flow of SMS between system and user mobile (average 4 SMS/day/ mobile).
- SMS are dependent on network traffic. So sometimes, messages use to take invariably long time defeating the basic purpose of system.

b. Missed call:

The operational cost of communication between user and control system cell phones was further reduced by using novel concept of miscall where in no charges are incurred by using only ring signal for information transfer[4]. A voice call is treated as miscall when either calling party disconnects after receiving ring tones or called party does not respond to call within specified time. The system cell phone was designed to send specified number of miscall(s) 6 within five minutes duration to user cell phone to report various conditions. Similarly, user cell phone sends commands to system cell phone by making specified number of miscalls. This novel concept of miscalls results in substantial savings without comprising the utility of system.

B. isadvantages of the existing system:

- Overhead of hardware.
- Less cost effective because of expensive hardware.
- Do not have alert facilities.
- Limited functions and facilities.

IV. PROPOSED SYSTEM ARCHITECTURE

For user to control the agriculture devices an android application is provided which is running on smart phone. In this it includes the application for water pump motor on/off, pesticide controller and user can schedule their tasks using this application.

In this system we are using internet for connecting user with the server machine. This server has a java application which gives commands to the microcontroller and provides video streaming of farm to the user. For capturing the video of activities going on in farm we are using webcams. All these devices such as microcontroller, webcams are connected with the server through USB cables and connecting wires.

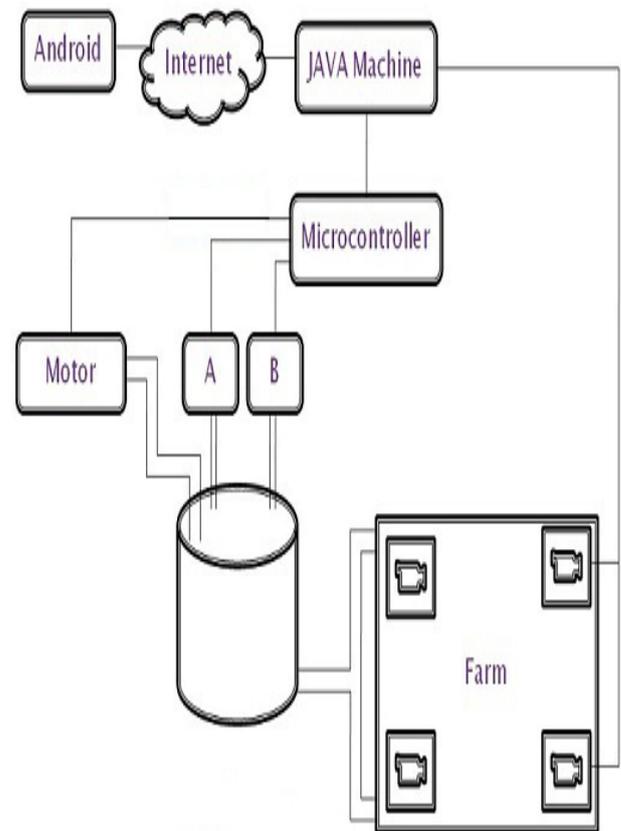


Figure 1: System Architecture

A. Components:

a. Microcontroller:

Microcontroller is used to control the operation of various machines and devices according to the program or given instructions in the memory or ROM(Read Only Memory) of the Microcontroller. The working of Microcontroller is controlled by program that is called Firmware and is written in ROM. Some latest ROMs can be Re-Programmed, but mostly it doesn't require.

b. Stepper Motor:

A stepper motor (or step motor) is a brushless DC electric motor that divides a full rotation into a number of steps. The motor's position can then be commanded to move clockwise or anticlockwise and hold at one of these steps without any feedback sensor, as long as the stepper motor is warily sized to the application.

c. Webcam:

A webcam is a video camera that feeds its image in real time to a computer or computer network. Unlike an IP camera (which uses a direct connection using Ethernet or (Wi-Fi), a webcam is generally connected by a USB cable. Webcams are mostly used for the establishment of video links; allow computers to act as videophones or videoconference server. We are commonly using a video camera for the World Wide Web because of that it is called webcam. Other well-liked uses include security observation, video broadcasting, and for capturing the social videos.

d. Water pump motor:

The pumping of water is a basic and realistic technique, far more practical than scoop it up with one's hands or lifting it in a bucket which is hand-held. This is factual whether the water is taken from a source, provided to a needed location, washing, or sewage treatment, purified, or used for irrigation, or for evacuating water from an undesirable place. So water pump basically takes the water from lower stream, pond, lake or river is often supplied to higher ground for irrigation, livestock, and cooking, cleaning or other uses by humans, who quite naturally need water.

B. Proposed system is able to do the following functions:**a. Motor On/Off:**

We provide interface on our android mobile through which user can on/off the motor placed in farm. As our mobile is connected to computer placed in farm, first the request is goes to server. Then server identifies that request and gives command to microcontroller. After getting command microcontroller rotates stepper motor in clockwise/ anticlockwise so that water pump motor will on/off.

If the user fails to give the stop command due to network failure, our java machine should be able to stop the motor automatically after specific time slot.

b. Pesticide automation:

With the help of an android application user is able control the quantity of pesticide that he/she wants to provide to plants. After selecting the proportion java application gives commands to microcontroller. Microcontroller rotates the stepper motor to stretch the springs and open the cap of bottle for the particular time. After the specific time force on spring will be removed and the bottleneck will be closed and that pesticides are provided to the farm after mixing it with water.

C. Online streaming:

For monitoring the farm activities user selects the camera zone from an android app and request is sent to the computer. According to the zone video will be captured from web-cams in the farm and that video will be forwarded to the user. We are performing the online-streaming with the help of javac open source library.

D. Scheduling:

This system provides facility to schedule the entire task using the android mobile phone. We are maintaining database of this schedule on the server computer. The user can add, modify or remove the existing task from his schedule.

E. Auto on/off of water pump:

Another import function of this system is when the user fails to give the off command for water-pump in case of network failure or any other problem then the server is

giving the off command to the microcontroller and water-pump will get off. We are providing the information regarding the timing for water supply in database so that server will take decision to stop the water-pump motor.

F. Reminders and notifications to user:

System gives reminders to the user about their schedules, the activity that should take place in the farm. This will help user to perform their task on required time.

V. EXPECTED RESULT

The farmer should be able to on/off the motor remotely. Android application should enable user to decide the proportion of pesticides and monitor the farming activities remotely.

The java application should also provide these functionalities to the farmer. When the farmer fails to give the command then at that situation the java application should done these task automatically timing constraints.

VI. CONCLUSION

The extensive capabilities of this system are what make it so interesting. From the convenience of android application, a farmer is able to control the motor and pesticides proportion and monitoring the farming activities going on in the agricultural field remotely. This makes it possible for the farmers to be rest assured that their farm is secure and that better Water Management can be made through the use of this system. This system will allow for improving the efficiency of the irrigation process.

VII. REFERENCES

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