GSM Based Motor Control for Irrigation System

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ABSTRACT: Agriculture is a subsistence of majority Indians and has great effect on the economy of the country. In a country like India, where climatic conditions change sustainably and irrigation facilities are poor. The main source for irrigation process is ground water. Nowadays ground water level is reduced drastically. In order to compensate this problem farmers are using both well and bore well to utilize ground water. This paper describes the automatic control of motor pumps by checking the level of well and bore well as a source forirrigation process. It prevents motor from dry running, single phasing and over loading. This paper presents the controlling and monitoring the level in well and bore well using GSM network. Level sensor is used to check the level in well and bore well. After checking the level controller sends the information to the user, depends on the level in the both well and bore well the user sends the message to the controller to turn on/off the motor by using GSM network.

KEYWORDS: Microcontroller, GSM module, Motor, Two relay circuits, Signal conditioning circuit, Level Sensors.

I. INTRODUCTION

India is basically an agricultural country, and all its resources depend on the agricultural output. Even in the modern span of industrialization, agriculture is the key area that decides the economic growth of the country. Agriculture also accounts for 8.56% of the country's total exports. Agriculture is the most important field as compared to others in India. The underground water level is slowly falling down and as well as rainfall is also reduced due to deforestation. In order to get the maximum yield in agricultural process, it is necessary to supply the optimum quantity of water, and it should be supplied periodically. This is achieved only through a systematic irrigation system. Irrigation is the science of planning and designing an efficient, low-cost, economic irrigation system designed in such a way to fit natural conditions. By the construction of proper distribution system and providing of adequate water supply will increase the yield of crops. The different methods of supplying water to the fields are Surface irrigation, Sub-surface irrigation and Sprinkler irrigation. The stored or diverted water is passed to the agricultural lands through some suitable distribution system.

The aim of this paper is to develop a simpler and cheaper solution that will provide remote control for motors through mobile phones using messages. There is a tremendous rise in the mobile phone users during the past few years. Remote monitoring of processes, machines, etc., is popular due to advances in technology. Remote monitoring through Internet based monitoring is one of the common approaches. This approach requires PCs (Client/Server) along with additional devices like buffers, modems, etc. for internet connectivity and software support for TCP/IP protocols and control system interaction. The price of such system varies greatly depending on speed and bandwidth requirements.This work provide Short Messaging Service (SMS)approach offers simple interface with only destination mobile phone address and message requirement without any protocol. So this method is suitable for remote monitoring of systems with moderate complexity.

II. SYSTEM MODEL

A remote control application will helps or guides the farmers to perform the operation like turn on and turn off the motor once the message is received to them. The motor can be turn on and turn off automatically by using the mobile

phone by sending a text message. A microcontroller based control panel is designed to control and monitor the level of well and bore well. Basically in the agricultural irrigation the motor is connected to the control panel. The control panel checks the generally known problems and rectify it prevent the motor from damage. The known faults that may occur are phase sequence change, dry running of motor, over load condition and absence of a phase. Microcontroller is programmed to check the faults and level in both well and bore well through commands of the user. The system block diagram is shown in figure-1.The messages are received from the user mobile to perform specific task. Based on the received signals, the signals are sent to the microcontroller to switch on/off the motor1 and motor2 through the starter using the two relays circuit. The relays are controlled by the ports.
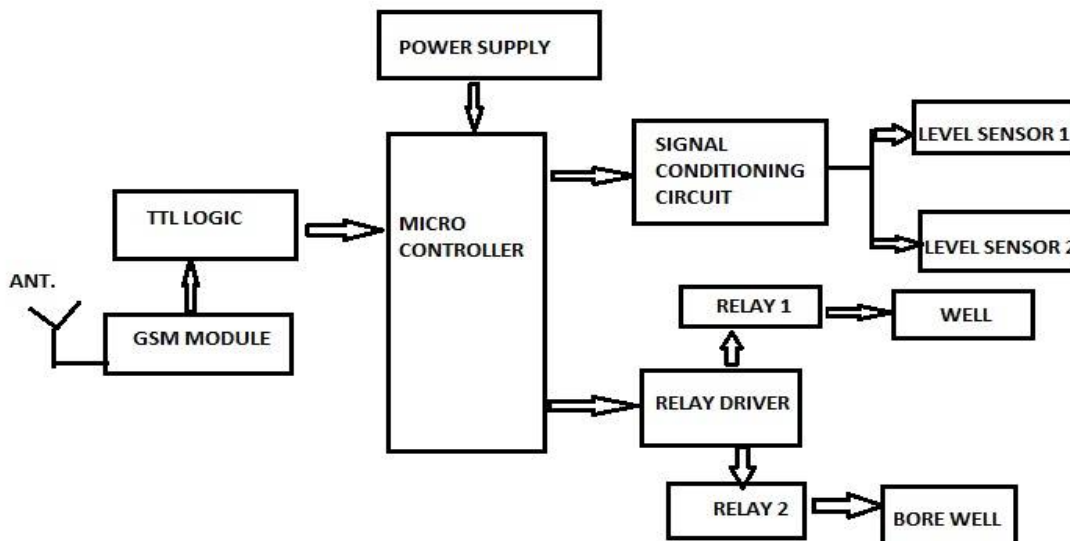

Figure-1 Block diagram

A. Mobile phone Interface
The GSM modem communicates with the user mobile phone to intimate the condition obtained from the microcontroller. Serial Port Adapter works in data and needs to be properly configured. Table-1 shows the commands and explanation which is send by the user. Microcontroller was already programmed to perform specified task. When the command STATUSCHK is received by the microcontroller. It checks status of the motor and level in well and bore well. And then the microcontroller sends message to the user about condition of level in well as well as bore as well. It follows that the user only decides which motor is going to on/off.

B. SMS Approach
SMS is stored and forwarded in the way of transmitting messages between mobile phones. The major advantage of using SMS alert the sender when SMS is delivered at the destination.

Table-1 Program Look up table

COMMANDS	EXPLANATION
STATUSCHK	It checks status of the motor and level in well and bore well.
MOTOR1-ON	Turn ON the motor-1
MOTOR1-OF	Turn OFF the motor-1
MOTOR2-ON	Turn ON the motor-2
MOTOR2-OF	Turn OFF the motor-2

III. CONTROLLER SYSTEM

There are several known controllers (8051 microcontroller, PIC microcontroller, AVR, ARM processor, etc…) are used to control the motors. In this paper microcontroller was used, to perform the various operations the several circuits are designed and interfaced to the microcontroller. The signal received from the GSM module is converted by using TTL logic circuit. The figue-2 shows the experimental setup for GSM based motor control for irrigation system.
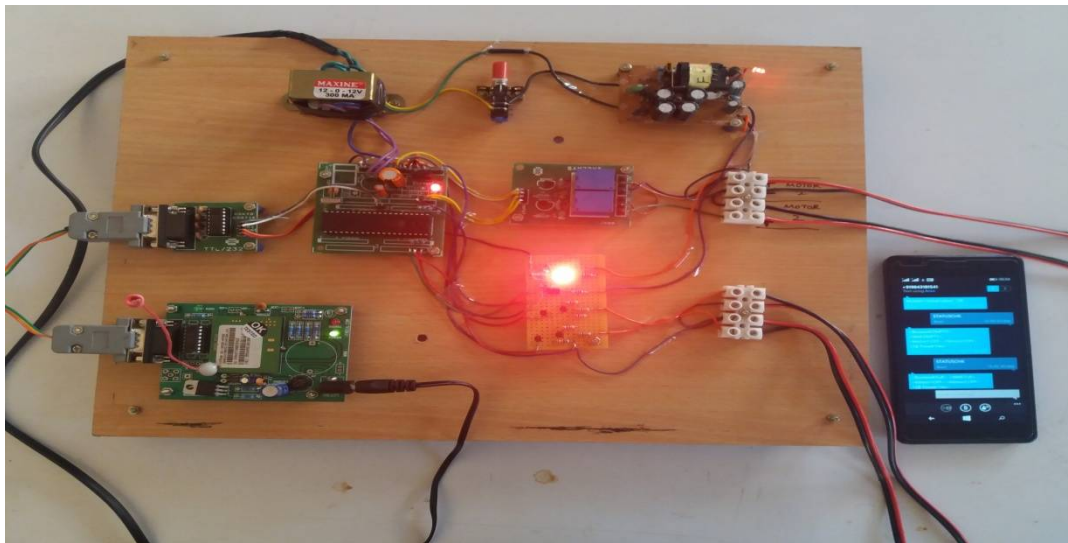

Figure-2 Experimental setup

IV. CONCLUSION

As a result the developed system enhances the motor control through wireless using GSM in the field optimally. The system ensures security of motor against overloads, dry running and phase imbalances. It also provides automatic restarting of motors. The main advantage of this system is water distributed at regular intervals, minimization of occurrences of motor faults,reduction in labour cost. The usage of mobile phone has been increased among the farmers. The system proves to be enormous benefit to farmers whose pump sets are situated far away from their homes due to capability of remote control using cell phone. Any mobile model or network can be used for communication sothat the system improves its flexibility to use. Low operating cost using messages are the major attractions of this system.

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