AGRO ELECTRONICS

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Abstract **—The agro electronics mainly deals with the present scenario of power cut and water conservation by the farmers using automated systems. These automated systems are more reliable, crucial capability, magnified and modest with the latest technology. The main concept is to control remotely by using GSM which enables control switch ON/OFF of the agricultural equipment's.**

Wireless control systems for agricultural equipment's is incorporated using GSM technology which was developed for economic and easy utilization by controlling the equipment's with the mobile phones. This system works by sending and receiving an SMS. Apart from that it can be preventing the motors from short circuit, single phasing, overload and dry run etc.

By merely using mobile (of any brand, any network) the users can control the motors from remote areas.

I. INTRODUCTION

Indian agriculture has, since Independence, made rapid strides. In taking the annual food grains production from 51 million tonnes of the early fifties to 206 million tonnes at the turn of the century, it has contributed significantly in achieving self sufficiency in food and in avoiding food shortages in our country. But to become self sufficient in food, the technology has to support the farmers to develop the better methods of cropping and irrigating the fields.

Present agricultural systems are limited only for electric pump sets and these are limited to the levels like overload, single phase etc. There is no system with wireless control, considering maximum difficulties of the farmer in electricity and water management. The difficulties related to this are:

Load shedding:

Rural electrification will be given a high priority as a prime mover for agricultural development. Due to uncertainty in mains power supply, the productivity and efficiency of farmers has been drastically reduced

The problems related to pumps are overload, dry run, single phasing etc. Taking into consideration all drastic situations discussed above, it was proposed to develop an electronic system which can be operated from remote place with the help of cell-phones. This will help the farmer in saving water and electricity along with providing ease for control.

II. SYSTEM OVERVIEW

The said system performs the controlling action using Short Messaging Services of cell phones. This means that induction motor may be started by sending SMS.As soon as the motor is started the slave mobile will send a SMS back to the master with a message such as: "done". This system may also be used to detect and acknowledge the master regarding the conditions such as: overload, dry run, temperature, water level and single phasing etc. The motor will be turned off automatically by alerting the farmer about single phasing.

III. GSM

GSM is a digital mobile telephone system that is widely used in many parts of the world. GSM uses a variation of Time Division Multiple Access (TDMA) and is the most widely used of the three digital wireless telephone technologies (TDMA, GSM, and CDMA). GSM digitizes and compresses data, then sends it down a channel with two other streams of user data, each in its own time slot. It operates at either the 900 MHz or 1,800 MHz frequency band.

There are two basic types of services offered through GSM: telephony (also referred to as tele services) and data (also referred to as bearer services). Telephony services are mainly voice services that provide subscribers with the complete capability (including necessary terminal equipment) to communicate with other subscribers. Data services provide the capacity necessary to transmit appropriate data signals between two access points creating an interface to the network. GSM also pioneered a low-cost (to the network carrier) alternative to voice calls, the Short

message service (SMS, also called "text messaging") The **Short Message Service (SMS)** is having the ability to send and receive text messages of 160 characters length when Latin alphabets are used, and 70 characters inlength when non-Latin alphabets such as Arabic and Chinese are used.

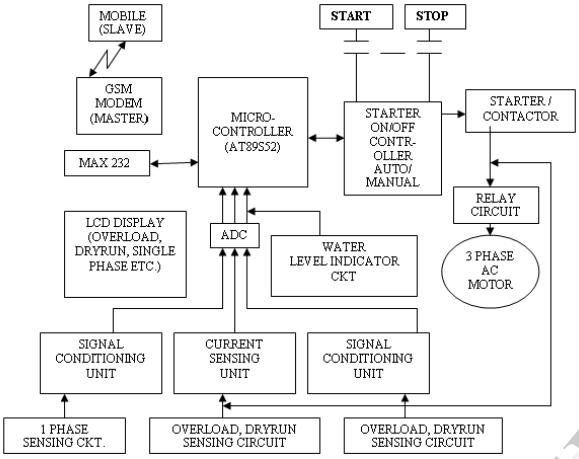
IV. SYSTEM IMPLEMENTATION AND WORKING:

Traditional systems consist of starters having overload relays. Even if single phase supply is present, starters start the motors but it will be risky. As far as the way of controlling of the motor/ pump is concerned, it is done directly through switches, through timers etc. The said system is technically developed system which uses

mobile phone for controlling the motor operations by sensing the status of various parameters as per the instructions given by microcontroller. The system has characteristics like:

- Cost effective
- Provides safety and relief
- Reduces working time

The System block diagram is represented in figure below:



For the controlling operation, the microcontroller AT 89C52 is used in the system. It counts the events in the counter mode using the timer 2 operation. It also checks the output of the sensing circuits and correspondingly takes the decision about keeping the motor ON or OFF. The AT89C52 is a low-power, high-performance CMOS 8-bit microcontroller with 8K bytes of Flash programmable and erasable read only memory. This is operated in TIMERmode by using TCON2 special function register. The working flowchart of the system is presented in figure 2.

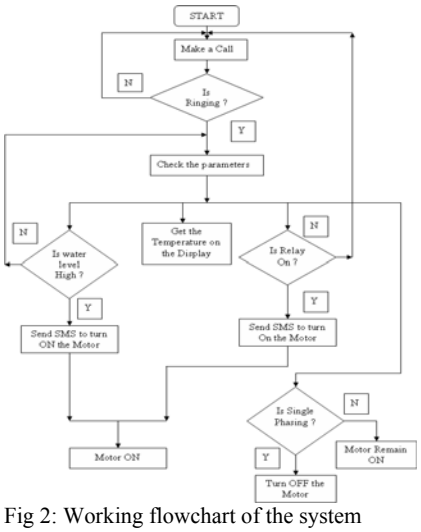


Fig 2: Working flowchart of the system

The type of operation is selected by bit C/T2 in the SFR T2CON (shown in Table).Timer 2 has three operating modes: capture, auto-reload(up or down counting), and baud rate generator. The modes are selected by bits in T2CON, as shown in Table below:

RCLK +TCLK	CP/$\overline{RL2}$	TR2	MODE
0	0	1	16-bit Auto-Reload
0	1	1	16-bit Capture
1	X	1	Baud Rate Generator
X	X	0	(Off)

Table3 : Timer 2 operating modes

Timer 2 consists of two 8-bit registers, TH2 and TL2. In the timer function, the TL2 register is incremented every machine cycle. Since a machine cycle consists of 12 oscillator periods, the count rate is 1/12 of the oscillator frequency. Apart from this controlling element, the Sensing circuitries play an important role in system workings which is described below:

A. WATER LEVEL SENSING CIRCUIT:

The purpose of water level indicator design is to detect and indicate the water level in the reservoir for avoiding the dry run problem. The main component of the water level is Op- amp which acts as the comparator and indicates the two levels as an output. Fig3

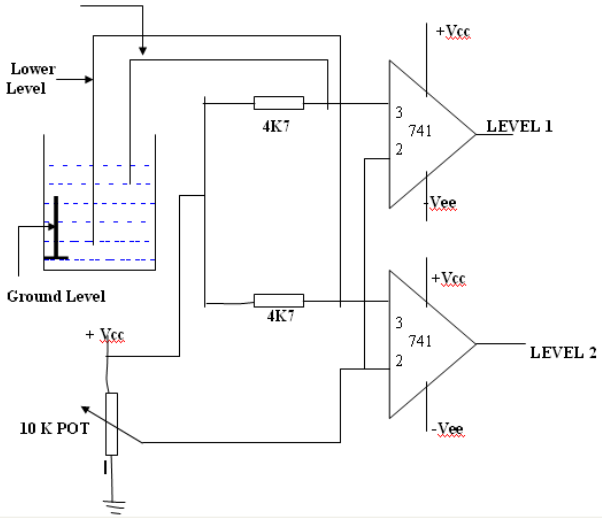


Fig3

B.SINGLE PHASING DETECTION CIRCUIT:

A 3- phase motor does not start if any one of the phases is absent. But if a phase fails during its running condition, it will carry on and get heated up. This may lead to the damage the motor windings. Hence it becomes necessary to provide the single phase detector

in the 3-phase motor starter. For this detection, the designed circuit consists of diodes and opto- coupler

C. TEMPERATURE SENSING CIRCUIT:

To measure and display the temperature of the ield winding of the motor, this circuit is introduced. For temperature sensing PT100 is used and Instrumentation amplifier is used for signal conditioning operation.

For the controlling action, the 89C52 microcontroller is used. Along with these sensing circuits, the mobile unit is used to remotely monitor and control the various agro parameters. The slave mobile is connected to the system. The remote controlling is done by the master mobile.

The specific SMS is sent from the master mobile to the slave mobile through the GSM modem. The controller interprets the received message from the slave mobile and initializes the action. The acknowledgement signal as well as the signal sensed by the different sensing units is sent back to the master mobile as a regular SMS.

V. ADVANTAGES

Due to the versatility of use of these GSM monitoring and control technologies in the agricultural and industrial market sectors, the following benefits may arise when using these systems: remote mobile monitoring of process variables using a cell phone.

remote mobile control of processes using a cell phone.

wireless monitoring & control of agricultural and industrial processes using a cell phone.

effective utilization of manpower and business resources depending on SMS contents.

immediate remote SMS warning about costly malfunctioning of production equipment.

immediate remote SMS warning about security breaches.

RESULTS

The developed unit was tested for results and the table 4 shows the details. The observations are of the single phasing detection circuitry. Line Voltage levels for

presence and absence of that particular phase (R, Y or B)

are listed below:

When phase is present(Volts) When phase is absent(Volts) R-phase 1.58 R-phase 2.89 Y-phase 1.71 Y-phase 3.48 B-phase 1.95 B-phase 2.98 Table 4: Observation table of single phasing circuit on 440V, 50 Hz.

When all the phases were present, the line voltage corresponding to R phase was 1.58V. While it was detected that R phase is absent, the line voltage corresponding to R phase was 2.89V.

Fig 6: Display of temperature and water level

Fig7:Indication of water level 1

Fig8: Indication of water level 2

According to the system flowchart, when the working starts, the LCD displays the parameters as shown in figure 6 to 8. 'temp' is the temperature of the motor parameter and the levels give the water level indications in the reservoirs.

As seen in the designs of the hardware the simple components like Op-amp 741, MCT 2E and Microcontroller 89C52, resistors and capacitors etc. are present, so the costing of this system is affordable for the simple farmer also. Because of the GSM module only the costing of this equipment is approximately 15000Rs.

CONCLUSION

In the era we are living in it would be irresponsible not to improvise with existing technology. This product ensures better connectivity to plants and remote locations, faster response to remote failures and higher productivity on the long run. The use of SMS's is currently extremely reliable.

This work is a real time application which gives the ease of controlling the motor remotely using mobiles.

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