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GSM Based Three Phase Motor Starter Controller

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ABSTRACT: Agriculture is one of biggest industry in India which serves food for more than a billion people every year. Irrigation is one of the factors. Most of the agriculturist's crop field is situated far from their residence, just turning on the water pump costs huge for their transportation per year. SMS/GSM Remote Water Pump Controller is a device which can control and monitor electric motors, agriculture pump sets through mobile phone. This is a GSM based remote controller to switch ON and OFF pump sets or any electric motor from remote location. This SMS/GSM remote controller helps the farmer to handle agricultural pump sets easily. Farmer can set running time of pump set after it gets ON. It also helps the farmers to save life from snake bite in night time, saves water, time and electricity. One SIM Card is required for its operation. The project is designed with minimal hardware components so that a beginner can accomplish it with ease. The circuit consists of power supply, which powers the whole setup. The Controller is the brain of the project which take decisions and GSM modem which sends and receives text SMS and communicate with the user and relay which controls the motor.

Keywords—GSM, Motor, Microcontroller, Relay, Transformer, Starter

1. INTRODUCTION

In today's fast changing world, everything is becoming compact, portable and mobile. The mobile handsets for communication are the biggest advancement in the area. These have made our lives much simpler and connected. Today almost everyone is familiar with it usage, and is able to draw advantage from it. The technologies for mobile communication have been ever evolving. Each had their share of pro's and con's. The Global System for Mobile communication (originally Grouped Special Mobile) represents the second generation of mobile communications. It is a digital telephony system, used in most parts of the world, starting from Finland in 1991 till now, with more than 690 mobile networks providing GSM services across 213 countries. It uses time division multiple access technique (TDMA).GSM digitizes and compresses data, then sends it down a channel with other streams of user data, each in its own time slot. It operates at either the 900 MHz or 1800 MHz frequency band. GSM provides with Subscribers Identity Module (SIM) to every user. It is a detachable card which identifies user's account to the network and provides authentication that allows appropriate billing. The unique roaming features of GSM allow cellular subscribers to use their services in any GSM service area in the world in which their provider has a roaming agreement. The idea behind the project is to utilize the mobile nature of communication and application provided by the GSM technology, namely SMS.SMS stands for Short Messaging Service .Short Message Service is an integrated paging service that lets GSM cellular Subscribers send and receive data right on their cellular phone's LED display, up to a maximum of 160 characters. The use of SMS makes the understanding and use of the project quite simple to the user.

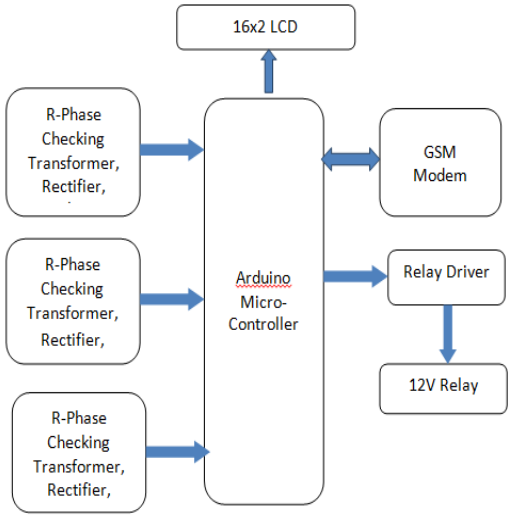
2. LITERATURE REVIEW

2.1 Muhammad et al (2010): simple approach to Irrigation control problem using Artificial Neural Network Controller. The proposed system is compared with ON/OFF controller and it is shown that ON/OFF Controller based System fails miserably because of its limitations. On the other hand ANN based approach has resulted in possible implementation of better and more efficient control. These controllers do not require a prior knowledge of system and have inherent ability to adapt to the changing conditions unlike conventional methods. It is noteworthy that ANN based systems can save lot of resources (energy and water) and can provide optimized results to all type of agriculture areas.

2.2 Kalyan et al (2011): The need for systems that make agriculture easier and more sustainable has increased within the past few years. The ability to conserve two of the most important resources of a farmer, water and time, has been the latest challenge. A system that provides this ability - through the use of efficient and reliable methods such as wireless sensor networking, sprinkler irrigation, GSM, SMS technologies and readily

available mobile phone devices – is certain to help the farmers get a better yield and on a larger scale, help the agricultural and economic growth of the country.

3 BLOCK DIAGRAM

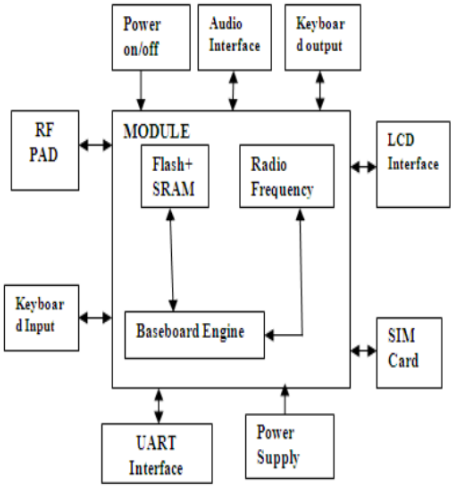


3.1 SYSTEM DESCRIPTION

In this project we can switch On & Off 3-Phase motor pump through mobile by using GSM. For this purpose we will use 3 Phase supply, Micro-controller IC, LCD Display, Max 232, GSM Module, Current Amplifier, relay & 3 Phase Pump. Above Block Diagram shows if 3 Phase supply is Ok GSM will give message to mobile & mobile will display message "3Phase is Ok". If we send message "Pump On" to GSM Module through mobile, relay circuit will switch in the pump with the help of Current Amplifier. Pump is working on 3 Phase power supply so out of 3 phase if any phase is braked, pump will immediately off & GSM will inform status of 3 Phase supply to the mobile. Then mobile will display message "Pump Off".

3.1.1 GSM MODEM

A GSM modem is a specialized type of modem which accepts a SIM card, and operates over a subscription to a mobile operator, A GSM modem exposes an interface that allows applications such as Now SMS to send and receive messages over the modem interface. The mobile operator charges for this message sending and receiving as if it was performed directly on a mobile phone. To perform these tasks, a GSM modem must support an extended AT command set for sending/receiving SMS messages, as defined in the ETSI GSM 07.05 and 3GPP TS 27.005 specifications. GSM modems can be a quick and efficient way to get started with SMS, because a special subscription to an SMS service provider is not required. In most parts of the world, GSM modems are a cost effective solution for receiving SMS messages, because the sender is paying for the message delivery. A GSM modem can be a dedicated modem device with a serial, USB or Bluetooth connection, such as the Falcom Samba 75 used in this document. The physical interface to the mobile application is a 60 pin board to board connector, which provides all hardware interfaces between the module and customers' boards except the RF antenna interfaces. You can turn on the module by driving the PWRKEY to a low level voltage for period time.

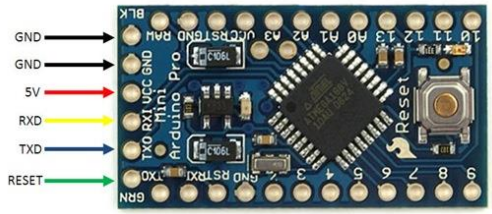


3.1.2 ARDUINO PRO-MINI CONTROLLER

The Arduino Pro Mini is intended for advanced users who require flexibility, low-cost, and small size. It comes with the minimum of components (no on-board USB or pin headers) to keep the cost down. It's a good choice for a board you want to leave embedded in a project. Please note that there are two versions of the board: one that operates at 5V (like most Arduino boards), and one that operates at 3.3V. Be sure to provide the correct power and use components whose operating voltage matches that of the board. The Arduino Pro Mini is programmed using the Arduino Software (IDE), our Integrated Development Environment common to all our boards and running both online and offline. Arduino Pro Mini is a compact but powerful Arduino board. Being designed with the idea to minimize the cost, the on-board USB to UART chip is taken out. leaving the board with pure AT mega microcontroller, voltage regulator and reset button. Yes, it's lower cost compared to the typical Arduino Duemilanove or Arduino Uno.

- ATMEGA 328 and pre-loaded with Arduino Duemilanove Bootloader

- A reset button
- 5V voltage regulator, reverse polarity protection
- 16MHz Crystal
- On board Power LED indicator
- A programmable LED (Status LED), D13 as on Arduino board.
- Pin label is compatible with Arduino



3.1.3 TRANSFORMER (0-12V/1A)

It is a general purpose chassis mounting mains transformer. Transformer has 240V primary windings and centre tapped secondary winding. The transformer has flying colored insulated connecting leads (Approx 100 mm long). The Transformer act as step down transformer reducing AC - 240V to AC - 12V. Power supplies for all kinds of project & circuit boards. Step down 230 V AC to 12V with a maximum of 1Amp current. In AC circuits, AC voltage, current and waveform can be transformed with the help of Transformers. Transformer plays an important role in electronic equipment. AC and DC voltage in Power supply equipment are almost achieved by transformer's transformation and commutation.

3.1.4 RELAY

A relay is an electrical switch that uses an electromagnet to move the switch from the off to on position instead of a person moving the switch. It takes a relatively small amount of power to turn on a relay but the relay can control something that draws much more power. Ex: A relay is used to control the air conditioner in your home. The AC unit probably runs off of 220VAC at around 30A. That's 6600 This is the schematic representation of a relay. The contacts at the top are normally open (i.e. not connected). When current is passed through the coil it creates a magnetic field that pulls the switch closed (i.e. connects the top contacts). Usually a spring will pull the switch open again once the power is removed from the coil.

4. FEATURES

Instead of DTMF Decoder we used SMS and Miss Call facility which provides easier and smooth control of motor.

5. APPLICATION

Useful in Farms to be install at well's motor starter. SMS/GSM water pump controller is a device which controls agriculture pump, electrical motors by using mobile this facility is very helpful for farmer to handle agricultural pumps.It also helps the farmers to save life from snake bite and wild animal attacks at night time.It also save water, time, electricity.

6. RESULT

Sr. No.	Condition	Status
1	If power supply is not available.	Message sends to owner-motor can't turn on.
2	One of the phases is down	Message sends to owner-motor can't turn on.
3	3 rings of miss call given	Motor on
4	5 rings of miss call given	Motor off

7. 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 and restarting of motors. The main advantage of this system is water distributed at regular intervals, minimization of Occurrences of motor faults, reduction in labor 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 so that the system improves its flexibility to use. Low operating cost using messages are the major attractions of this system.

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