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SINGLE PHASE ENERGY MOTOR CONTROL BY USING GSM

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ABSTRACT

The autonomous used to detect the three types of fault which cause damage to the motor. It is expected that this application will be comfortable for the farmers and this provides easy access of motor to a greater extent. All these control process are achieved by using a PIC microcontroller, GSM and Different interfacing and control circuits.

The receiver phone receives the DTMF signal or a SMS message that is send from the user's phone and then sends it to the DTMF decoder or the GSM modem which in turn sends the output digital signal to the microcontroller. Then the microcontroller, based on the received signal, controls the different relays connected through ULN2003 (Darlington transistor) and triggers the required appliance may be Direct on line or Star Delta. The motor is controlled by the micro controller and the present status of motor is sensed and it is automatically controlled by itself and the information is transmitted to the corresponding person through GSM network. The GSM mobile phone is used as an alternative to turn on and off the motor through a message or a missed call and also to send message to the owner about the following three faults. agriculture irrigation using GSM network. This project provides the development of mobile phone as remote control application for submersible motor pump which is used in agriculture irrigation. The motor connections depends upon its horse power, it Embedded System based submersible motor control to prevent it from over load, dry run and single GSM module SIM300 is being used in the project here. It is just like a cell phone with all the facilities of sending and receiving a message, sending and receiving calls. It has a communication that can be programmed using AT commands. The signal names for the GSM modem communication port include the following; audio input and output pins (for

connecting external hands free audio devices), mute control pin, flash programming signal pins, external power pins, and receiver and transmitter pins. Then at last voltage controllers are associated over the circuit to secure the supplies from any kind of voltage variances. All the gadgets we utilize are delicate and sensitive, so protection from any kind of variances is very important.

I. INTRODUCTION

India is basically an agricultural country, and all its resources depend on the agricultural output. With the rapid development of agriculture in India, many automatic technologies have been introduced into agricultural productions. The total rainfall in a particular area may be either insufficient, or ill-timed. In order to get the maximum yield, it is essential to supply the optimum quantity of water, and maintain correct timing of water. This is possible only through a systematic irrigation system-by collecting water during the periods of excess rainfall and releasing it to the crop as and when it is needed. Irrigation is the science of planning and designing an efficient, low-cost, economic irrigation system tailored to fit natural conditions.[1] By the construction of proper distribution system, the yield of crop may be increased because of controlled water supply. The different methods of supplying water to the fields are Surface irrigation, Sub-surface irrigation and Sprinkler irrigation.

The stored or diverted water is conveyed to the agricultural fields through some suitable distribution system. Hence, there are now pressing needs for intelligent irrigation system. The aim of this project is to develop a cost effective solution that will provide remote control for induction motors through mobile phones using missed calls and messages. The mobile user in the world has a tremendous rise during the past few years. Remote monitoring of processes, machines, etc., is popular due to advances in technology and reduction in hardware cost.[2] Remote monitoring through Internet based monitoring is one of common approach. This approach requires PCs (Client/Server) along with additional devices like modems, buffers, etc. for internet connectivity and software support for TCP/IP protocols and control system interaction. The cost of such system varies greatly depending on speed and bandwidth requirements and hence is justified usually for bio- medical and industrial applications where intensive data transfer is required. Cellular networks provide Short Messaging Service (SMS) and Multimedia Messaging Service (MMS), approach offers simple interface with only destination cell phone address and message requirement without any header / protocol overhead. So this method is suitable for remote monitoring of systems with moderate

complexity. Wireless sensor networks also offer opportunity for remote monitoring During the present days technology is all about the automation and wireless control of all the equipment used in industries, factories and households. Any equipment that can be controlled wirelessly is more easly.

II. GSM Technology

GSM implies worldwide framework for versatile correspondence. GSM is a global advanced cell telecommunication. The GSM standard was proposed by ETSI (European Telecommunications Standard Institute) in 1989. The primary business administrations were launched in 1991 and after its initial presentation in Europe, the standard went worldwide in 1992.

Today's third era GSM systems convey excellent and secure versatile voice and information administrations with full abilities over the world. GSM is a massively fruitful engineering and as uncommon story of worldwide accomplishment. The GSM Association evaluates that advances characterized in the GSM standard serve 80% of the worldwide portable business, including more than 5 billion individuals crosswise over more than 212 nations and domains, making GSM the most omnipresent of the numerous guidelines for cell systems.

The Global System for Mobile Communication (GSM) system is cell telecommunication system with an adaptable structural planning following the ETSI Gsm900/GSM 1800 standard. Seimen's usage is the advanced cell versatile correspondence framework D900/1800/1900 that uses the precise most recent innovation to meet each prerequisite of the standard.

2.2 DTMF (Dual Tone Multi Frequency)

The main principle of the DTMF is that it takes a number code from the number pad converts it to DTMF (Dual tone multi frequency) signal and a DTMF decoder converts the DTMF signal to a digital code that can be fed to a microcontroller. A DTMF generator generates two frequencies corresponding to a number or code in the number pad which is transmitted through the communication networks, constituting the transmitter section which is simply equivalent to a mobile set. In the receiver part, the DTMF detector IC, for example MT8870 detects the number code represented by DTMF back, through the inspection of the two transmitted frequencies. The DTMF frequencies representing the number codes are shown below. DTMF generation is a composition of two audio signals or two tones between the

frequency 697Hz and 1633Hz. In a DTMF each row has its own unique tone frequency and also each column will have its own unique tone. The tone frequencies are selected such that harmonics and intermediation products will not cause any unreliable signal. Each and every tone falls within a proper band pass before valid decoding takes place. If one tone falls outside the band pass spectrum, the decoder will become unreliable. A DTMF decoders main purpose is to detect the sinusoidal signals in the presence of noise.

2.3 GSM Module

GSM module SIM300 is being used in the project here. It is just like a cell phone with all the facilities of sending and receiving a message, sending and receiving calls. It has a communication that can be programmed using AT commands. The signal names for the GSM modem communication port include the following; audio input and output pins (for connecting external hands free audio devices), mute control pin, flash programming signal pins, external power pins, and receiver and transmitter pins.

Here the RX and TX pins are used for the serial communication with the microcontroller. There are various AT commands to check the signal strength and connection and SIM status etc. Here the Hyper Terminal is used to initially interface with the computer to check the module. It also has an antenna to receive the GSM signal from the user's phone. The basic AT commands are loaded into the program of microcontroller for it to interface with the GSM module. The figure given below shows a GSM module.

Fig. 2.3.1: GSM Module SIM300.

2.4 8051 Microcontroller

At whatever point we are learning about new machine we need to think about the machine capacity we are utilizing and we can do it by studying the internal hardware design (device

building design), and additionally to think about the size, number and the extent of the registers. A microcontroller is a single chip that contains the processor, the ROM, the RAM, a clock and an I/O control unit. It is additionally called a "workstation on a chip"(small computer). Now a days billions of microcontrollers units (Mcu's) are inserted every year in a different items from toys to spaceships. Case in point, a single vehicle utilizes 70 or more microcontrollers. The below figure portrays a general block diagram of microcontroller.

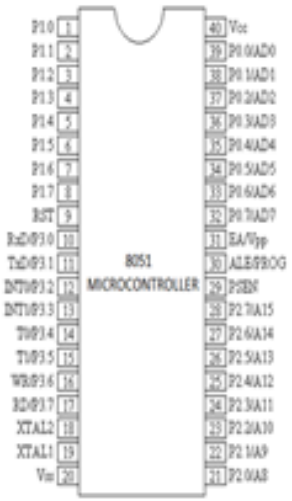

Fig 2.3.2 Block diagram of 8051 Microcontroller

3.1 Circuit Design and Procedure

The block diagram of our project is shown below in the fig3.1.0. It is an outline description of how we have implemented our project and the various steps involved in it. From the block diagram given below, the first mobile station is used as a transmitting section from which the user sends a code that contains commands and instructions to the second mobile station which is based on a specific area where our control system is located, through GSM network. The received code can be in either DTMF format which is send to the DTMF decoder connected via headset jack of the phone or through an SMS.

The DTMF decoder converts it into digital signal and sends it to the microcontroller interfaced to it. Then the microcontroller processes the code and carries out the specific operations. The ULN2003 is used to drive the relay circuits which switches the different appliances connected to the interface.

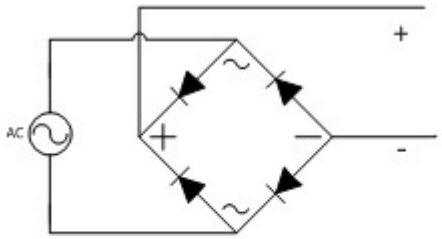

Fig 3.1.1 Bridge Rectifier

1. Filter Circuit

The filter circuit is simply a capacitor of 1000uf associated in parallel to the power circuit. It goes about as a filter that seems to be, it filters outs the ripples present in the circuit brought on throughout the rectification from the diodes in the bridge circuit. Regardless of the amount consideration is taken there are still ripples in the output voltage of the circuit, which is destructive for the IC's utilized. So filter capacitor evokes them, along these lines helping keeping up security in the outlined circuit.

2. Voltage Regulator

Then at last voltage controllers are associated over the circuit to secure the supplies from any kind of voltage variances. All the gadgets we utilize are delicate and sensitive, so protection from any kind of variances is very important. A voltage controller is intended to naturally keep up a consistent voltage level.

3.1.3 Control Circuit for both Dtmf and Sms Baseddesign

ULN2003

ULN2003 is a high voltage and high current Darlington array IC. It contains seven open collector Darlington pairs with common emitters. It is an arrangement of a pair of bipolar transistors. Each channel or pair in ULN2003 is rated at 500mA and can withstand a peak current of 600mA. The inputs and outputs are provided opposite to each other in pin layout. Each driver additionally holds a suppression diode to dissipate voltage spikes while driving inductive loads. The logical output for it is a negation, i.e. it gives a low o/p for a high i/p and a high o/p for a low i/p. The logical diagram for the IC is shown below. The relays are the final stage of this device which play a very prominent role to control the final appliances. The principle on that the relays work is electromagnetic force. When electricity starts flowing through a coil, it becomes an electromagnet. Steel plates are attracted by this electromagnetic

coils get attracted, which is attached to a switch. So the switch's motion (ON or OFF) is controlled by current flowing through the coil, or not respectively.

A relay's very useful feature is that it can be used to isolate different parts of a circuit electrically. It allows a low voltage circuit (e.g. 5v DC) to switch the power in a high voltage circuit (e.g. 100v AC or more).

3.2 Limitations

The proposed system only works in the places of good reception of signal and remote areas where there is no strong GSM signal, the equipment does not respond always.

There should be always continuous power supplied to the equipment so that the microcontroller and phone connected to it works.

Circuit Diagram

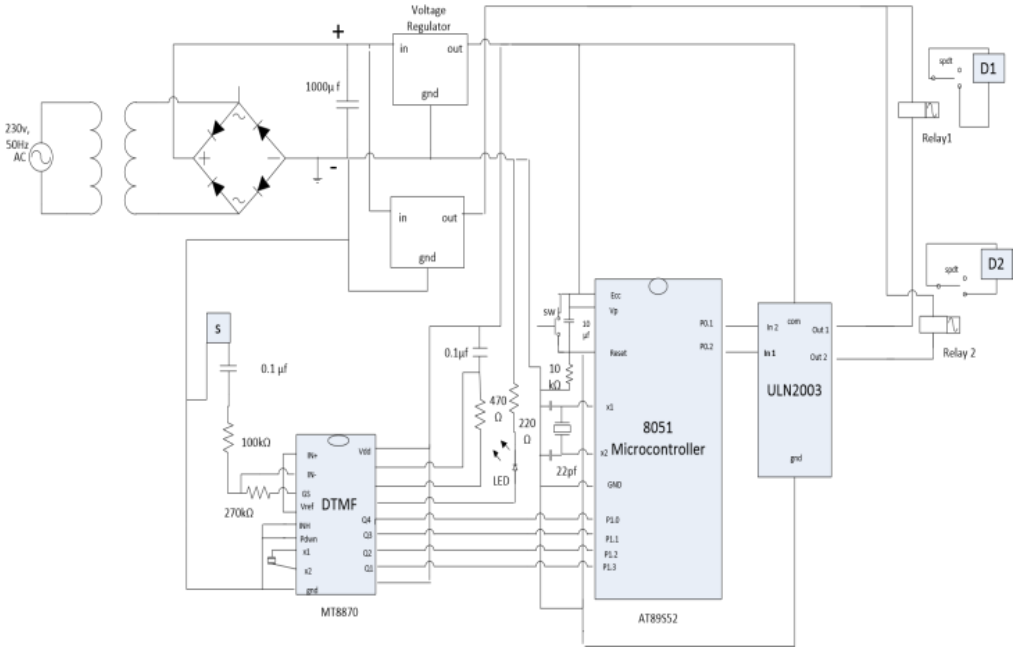

Fig. 3.1.5: Circuit Diagram.

The simulation circuit is build such that, the 8051 microcontroller receives the signal from the keypad through port P1 and it decodes the signal and then as per the authenticated code, it sends the signal to the relay connected to the pins P3.4, P3.5, and at the same time, the LCD display is being used for the display of the code given by the user, and it is connected to the microcontroller through the port P2.

The authenticated code given in this project is 78 and after that to select which device to be turned on, user select 1 or 2 and 0, 1 are pressed for on and off of the devices individually. The simulated output is shown in fig.5.1.2 and the program code for the microcontroller is given below.

4.1 SIMULATION RESULT

Proteus software has been used for the simulation of the circuit discussed above. As the DTMF decoder MT8870 is not present in the IC's given in the simulation, 8051 microcontroller is programmed to use as the DTMF decoder in this case. The simulation circuit is shown in the below given fig.5.1.1.

5. CONCLUSION

The project is aimed to design and implement a GSM based wireless control of house hold electrical appliances.. After doing different tests and programming different codes, eventually the obliged outcome is put forward. It is a fast and efficient approach to control the devices. This equipment works anywhere with a great gathering od sign. At last the obliged result is attained with GSM module Sim300 based outline for effective and compelling result.

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