Intelligent Three Phase Motor Monitoring System

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Abstract- *Design idea about remote monitoring device of three-phase intelligent motor based on GSM signal is proposed. The Remote terminal can also control the motor according to the state of three-phase voltage and the detected results can return to the control terminals Real-time. Thus it overcomes the deficiency of the traditional remote control and detection device.*

With the development of communication technology we have introduced GSM Module for controlling the action of motor. We often need to switch the motor in the process of farmland irrigation for irrigation position adjustment, but due to the distance between farmland and water, we need to go back and forth to manually switch control motor, it takes time and effort. Based on this situation, the remote control device arises at the historic moment.

Hence, the design of mobile phone software and the terminal software is simply introduced. After debugging and running, the mobile phone software can send SMS/Voice Call command to control the remote terminal switch of motor and real-time display the state of motor returning from remote terminal. Also displays the regarding message in LCD screen. To avoid

The burning of motor when water level gets below the certain level, Dry Run Detection detects the level of water and motor will turn off automatically.

Keywords- Motor monitoring; GSM signal; Lack of phase and phase sequence.

I. INTRODUCTION

With the development of communication technology, GSM network service function based on Global System for Mobile is widening forward to the field of industrial control and remote control. The system network is stable and widespread. Its short message function can realize the user information processing in a safely and reliable way. This function is particularly suitable for long-distance or inconvenient to use wire communication medium between the control center and the terminal equipment.

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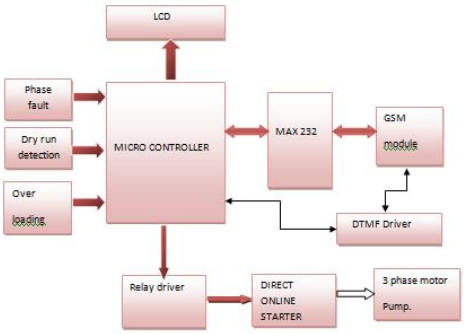
Based on this situation, we have introduced Three Phase Motor Starter with the help of GSM Module and Microcontroller. After debugging and running, the mobile phone software can send SMS/Voice Call command to control the remote terminal switch of motor and real-time display the state of motor returning from remote terminal. Communication between Microcontroller and GSM Module is done through a serial port to send AT Commands.

Mobile phone industry is classified among the fastest growing engineer's branches. It has to be exploited for vast applications. Reliable and affordable on mobile cellular home subscribe have reached saturation point with such information. The basic cell phone that has been mainly utilized for remote switching and control activities.

On the other hand, the theory and practice have proved that phase-failure of three-phase power supply has a harmful effect for the operation of the three-phase asynchronous motor. Motors can be burned motors in dozens of seconds. This is great economic losses for the motor. Thermal relay, voltage relay, current relay and solid phase protector are used as open phase protection circuit in practical circuit. Given the limitations of these components power requirements, it is not ideal for protection of small and medium-sized irrigation motor in rural. It is of great significance for improving the efficiency of the rural electric irrigation to make efforts to solve the problem and developed wireless monitoring device without being limited by the obstacle and the distance.

II. BLOCK DIAGRAM AND DESCRIPTION



PHASE FAULT:

In an electric power system, a fault or fault current is any abnormal electric current. For example, a short circuit is a fault in which current bypasses the normal load. An open-circuit fault occurs if a circuit is interrupted by some failure. In three-phase systems, a fault may involve one or more phases and ground, or may occur only between phases. In a "ground fault" or "earth fault", current flows into the earth. The prospective short-circuit current of a predictable fault can be calculated for most situations. In power systems, protective devices can detect fault conditions and operate circuit breakers and other devices to limit the loss of service due to a failure.

In a polyphase system, a fault may affect all phases equally which is a "symmetrical fault". If only some phases are affected, the resulting "asymmetrical fault" becomes more complicated to analyze. The analysis of these types of faults is often simplified by using methods such as symmetrical components.

The design of systems to detect and interrupt power system faults is the main objective of power-system protection.

DRY RUN DETECTION:

Dry running protection is one of the most important monitoring functions, as bearing and shaft seal may be damaged if the booster pumps run dry. It is thus always recommended to install dry running protection on all booster sets.

OVER LOADING:

This protection function prevents damage to the Power Supply itself due to over current (including output short-circuits). The protection function is activated and the output current is limited when the load current is greater than the overcurrent detection value (this value depends on the model).The output voltage will also drop according to the overload (load impedance).The drop level depends on the overload conditions and load line impedance.

DTMF DRIVER:

Dual Tone Multiple Frequency system is used by touch tone telephones. DTMF assigns specific frequency to each key so that it can be easily identified by microcontroller. DTMF is the signal to the phone company that you generate when you press an ordinary telephone's touch key.

With DTMF, each key you press on your phone generates two tones of specific frequency so that the noise can't imitate the tones, one tone is generated from a high frequency group of tones and the other from low frequency.

RELAY DRIVER:

A Relay driver IC is an electro-magnetic switch that will be used whenever we want to use a low voltage circuit to switch a light bulb ON and OFF which is connected to 220V mains supply. The required current to run the relay coil is more than can be supplied by various integrated circuits like Op-Amp, etc. Relays have unique properties and are replaced with solid state switches that are strong than solid-state devices. High current capacities, capability to stand ESD and drive circuit isolation are the unique properties of Relays.

MICROCONTROLLER:

Every PIC microcontroller architecture consists of some registers and stack where registers function as Random Access Memory (RAM) and stack saves the return addresses. The main features of PIC microcontrollers are RAM, flash memory, Timers/Counters, EEPROM, I/O Ports, USART, CCP (Capture/Compare/PWM module), SSP, Comparator, ADC (analog to digital converter), PSP (parallel slave port), LCD and ICSP (in circuit serial programming) The 8-bit PIC microcontroller is classified into four types on the basis of internal architecture such as Base Line PIC, Mid Range PIC, Enhanced Mid Range PIC and PIC18

DIRECT ONLINE STARTER:

A direct on line (DOL) or across the line starter applies the full line voltage to the motor terminals, the starters or cubicle locations can usually be found on an ELO drawing. This is the simplest type of motor starter. A DOL motor starter

also contains protection devices, and in some cases, condition monitoring.

SIM 800:

SIM800 module are upgraded version of its previous GSM Module series SIM900.SIM800 is the full version quad band SIM800.SIM800 GSM module have an inbuilt Bluetooth stack ,accessible using AT commands. This modem operates from 3.4Vto 4.4V supply range.SIM800 can be operated worldwide because they can operate in all four GSM bands used across the world.

RS232:

RS 232 is a standard for serial communication transmission of data. It formally defines the signals connecting between a DTE (Data Terminal Equipment) such as a computer terminal and DCE (Data Circuit terminating Equipment), such as modem.

It is an integrated circuit which converts the signals from the RS232 serial port to the proper signal which are used in the TTL compatible digital logic circuits. The MAX232 can convert the signals like RX, TX, CTS, and RTS and it is a dual driver/receiver.

DB25 is used as a connector in RS232 standard.

GSM MODULE:

GSM MODULE is used to establish communication between mobile phone software and a GSM – GPRS system. It is an architecture used for mobile communication in most of the countries. Global Packet Radio Service (GRPS) is an extension of GSM that enables higher data transmission rate. This modem needs AT Commands for interfacing with microcontroller which is communicated through serial communication.

-Some AT Commands are as follows-

AT+CMGF Send a short message command
AT+CMGR Read SMS message
AT+CMGS Send SMS message
AT+CMNI New SMS message indications

HARDWARE SYSTEM DESIGN

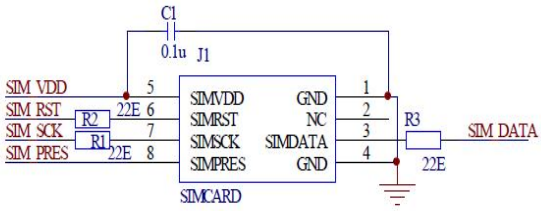


Fig. SIMCARD

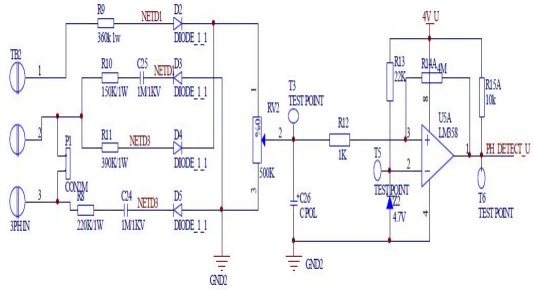


Fig. PHASE DETECT

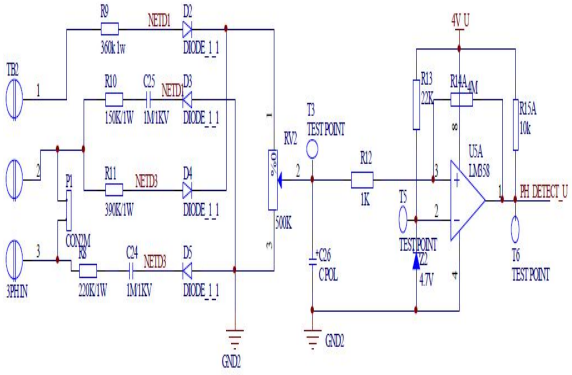


Fig.POWER SUPPLY

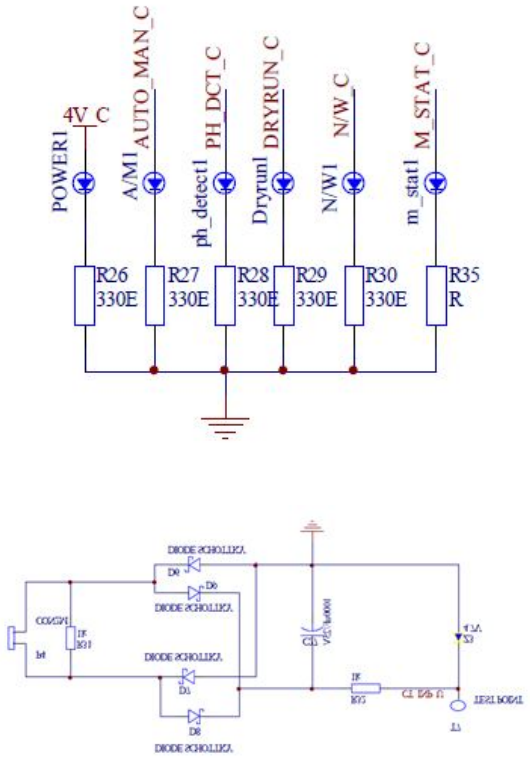


Fig. INPUT

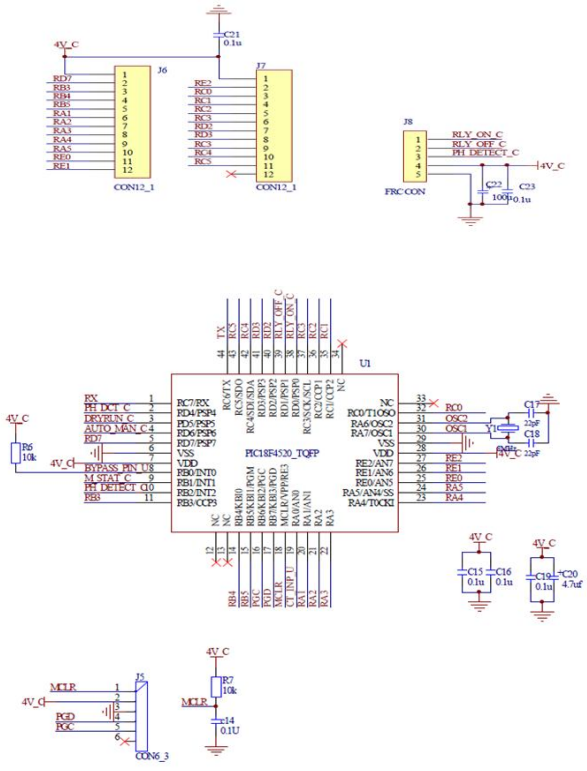


Fig. CONTROLLER SECTION

III. CONCLUSION

After debugging and running, the terminal device can realize remote monitoring for the motor. And using the stable and widely covered GSM signal can make the terminal device be applied more widely. The mobile phone software of the control terminal is based on the multisystem to develop, more wide scope of application and simple.

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