AUTOMATIC CONTROL OF SUBMERSIBLE MOTOR

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Abstract: This project is developed for the users to control a submersible pump in automatic manner. There are one sets of sensor connected. One sensor at the end of the delivery pipe of the bore well. When the power supply is switched on, the sensor connected at the delivery pipe senses the flow of water for some seconds. If there is no flow of water, it sends signal to the microcontroller and the microcontroller stops the motor. If there is continuous water flow in the delivery pipe, there is availability of water in the bore.

Keywords: Bore-well, microcontroller, submersible motor.

1. INTRODUCTION

Every year, more than 20% of electric motors installed burnout around the world. This is in spite of protection systems being provided and dry run. This proves inadequacy of selected protection systems. In most cases, the reasons for pumping system failure are dry run of motors. These include improper selection of pump, improper handling of the system, and improper selection of protective devices. The protective device for the pump is the heart of the total system. Great care is needed while making an appropriate selection of the same. Different kinds of protective relays are available to perform different functions. It is important that a proper protective device is selected for this. So to avoid this we provide the timer auto for motors. Incorrect selection of protective devices can lead to the notion that these are not fulfilling their intended functions.

Our pump motor protector controllers are microcontroller based systems with instant response (faster than conventional starter systems) as this response is based on solid state devices & ultra precision current sensing elements. These systems trip and protect instantly at improper current sensing. Dry running is dangerous for submersible pumps. Motors of submersible pumps are designed for running under water. They use water as a heat-transfer medium. In case the water level goes down and the pump runs dry, the motor gets overheated and burns out. Due to such Dry running the bearing temperature also increases, damaging the bearing and the surrounding portion of the pump.

As we have known that the electrical system and Agriculture in submersible motor important equipment for water transfer from lower level to upper level of bore well. The operation of these submersible motor under this condition such as Dry-running and overloading for long time will reduce there life significantly high temperature of motor, occurring faults. It should be control by starter of the motor, but Dry running condition is not controlled by starter. The project consist a smart electronic monitoring devices attached to the submersible motor device is microcontroller and sensors attached.

2. Block diagram

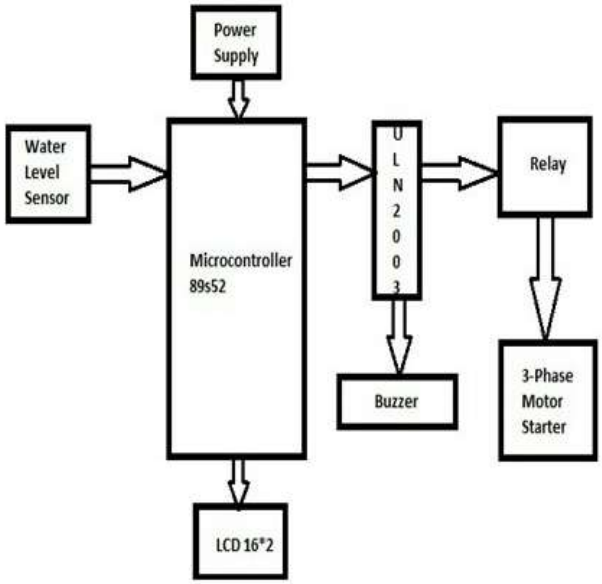


Fig1. Block Diagram of System

The AT89s52 is a low power high performance CMOS 8-bit microcontroller with 8k bytes of in system programmable flash memory. The device is manufactured using Atmel's high-density nonvolatile memory technology and is compatible with the industry standard 80C51

instruction set and pin out. The on chip flash allows the program memory to be reprogrammed in system or by a conventional nonvolatile memory programmer.

The relay block has a potential to drive the 3-phase motor or submersible motor. In this we are using relays for controlling the wire based sensor is sensed to delivery pipe. Output signal from 89s52 is given to pull up register through ULN2003 and than the further energizing relay.

3. Circuit Diagram & Analysis

The power supply for the circuit the 230v. 50Hz AC mains is converted to D.C. 12V by using of cell phone charger. Then it is filtered by capacitor C1 regulated by IC 7805 Regulated 5V is used to power the circuit except controller but relays operate to 12 V supply.

The microcontroller is the heart of the our system. it is an 8-bit microcontroller with 8KB flash programmable & erasable read only memory. It was 32 input / output (I/O) lines two 16bit times/counters, a five vector two level interrupt architecture, a full duplex serial port on chip oscillator and clock circuitry. The crystal frequency 11.0592 MHz along with two 100pf capacitor provides basic clock frequency to microcontroller AT 89s52. Here we provide the separate button for rest which is connected to the pin no.9 of microcontroller.

In this part 1 of controller we connect the push buttons. These push buttons are used providing on time to the microcontroller.

The port 0 of port is used for controlling the motor through the relay. The port 0 is connected to the pull up resistor is R_1 andR_2 through the ULN 2003. The ULN 2003 is dual in-line 16-pin is used for the 5V signal convert to 12V signal given to the relay because of the relay operated on 12V supply.

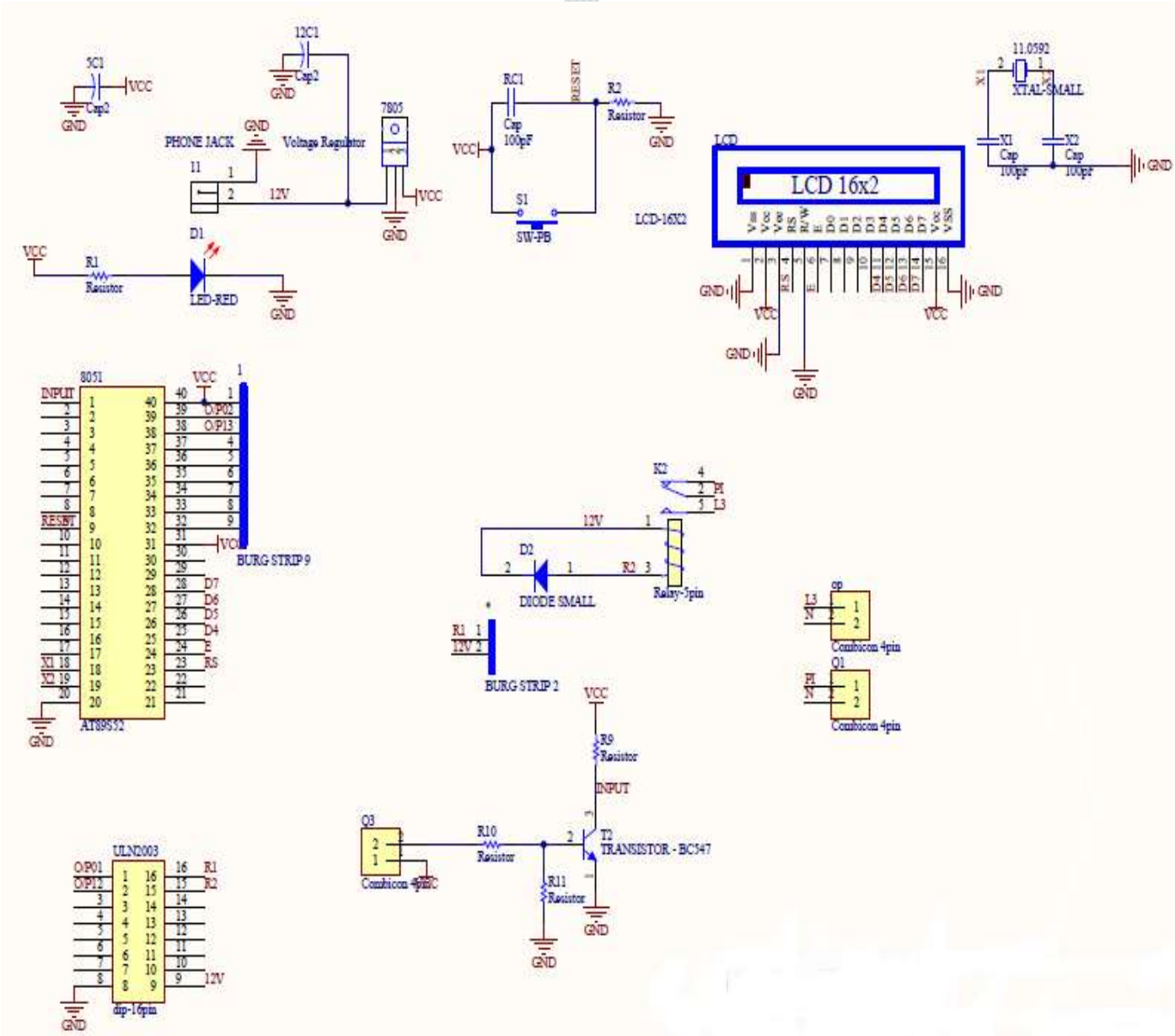


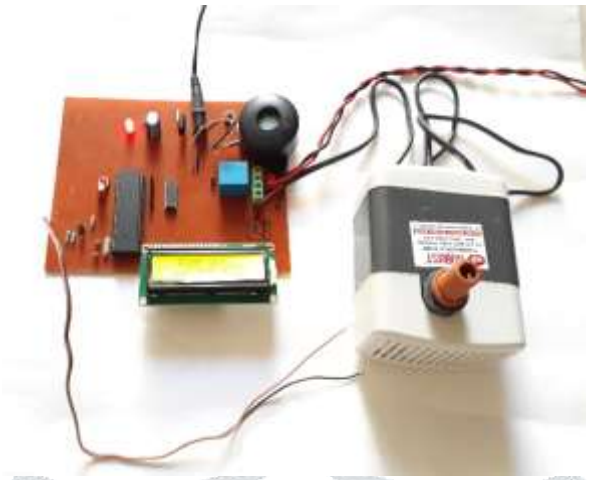
Fig.2. Circuit Diagram

The port 2.0 provide to the Display (LCD 16*2). When the motor is healthy condition and faulty condition the LCD is display Motor ON/OFF.

The BC 547 transistor connected between Vcc and GND pin.BC547 of base connected to the 2 combicon pins. Here Vcc equal to +5V. If these two pins are short so, the Vcc connected to base. Hence base- Emitter junction forward bias and +5V is directly ground so, Vcc Supply is

take in output and motor is ON. If these combicon pins not shorted because of no water flow to delivery pipe so, the collector emitter junction forward bias. The Vcc supply is ground and output take zero so the motor is OFF.

4. Implementation of Hardware



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5. Advantages

- Low noise operation and low maintenance.
- Better efficiency
- High Discharge and low power consumption.
- Light weight and compact design.
- Clean and Spatter – proof impeller blade weld assembly provide smooth flow of water.

6. Conclusion

We have developed the system which will avoid the dry run of submersible motor by using microcontroller and assembly language programming.

In the developed work we solve the problem of dry run of motors by providing wire based sensor at the delivery pipe of motor.

Acknowledgment

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