

# Programmable on and off Three Phase Induction Motor

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## ARTICLE INFO

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**Abstract:- Programmable on off control of 3 phase induction motor ,As the name indicates propose system is fully programmed i.e. the on time and off time of the motor hast to be set then the motor will have to be on and off on that time. In such way motor has to start at particular time since system is designed. The program already is in such passion.**

□ **Also for providing the safety in system has a IR sensor in the circuit connection also provided a password based circuit so that we can operate the circuit by using password.**

□ **Also for protection against overloading, single phasing, phase imbalance, change in phase sequence, short circuit is there.**

## INTRODUCTION OF SYSTEM

Programmable on off control of 3 phase induction motor ,As the name indicates our system is fully programmed i.e. the time and days on which the motor should have to be on and off will obtain automatically at that particular time since we designed the program already in such passion

Also for providing the safety we implemented a IR sensor in the circuit connection also we provided a password based circuit so that we can operate the circuit by using password.

Also for protection against overloading, single phasing, phase imbalance, change in phase sequence, short circuit .

What is programmable controller?

A 3 phase motor programmable controller that automatically turns on/off controller can be made with a programmable time switch.

## NEED OF PROPOSE SYSTEM

To provide the safety to motor against any misshaping or fault.

To provide the safety to person who is dealing with motor.

To precise control on the motor.

## OBJECTIVE

1. To make automatic operation of motor by avoiding costly logic circuits
2. For implementing automation of machine In small scale industries.
3. It operates the motor at accurate time , as programmed in real time switch
4. Control of line voltage with total security .
5. To proved instant stoppage of machine in case of fault or emergency condition.
6. Operating the load with modern age circuit breakers.
7. To provide protection to the machine from various electrical faults.

## ADVANTAGES OF THE SYSTEM

1. Motor operates on specified schedule.2
- .Automatic controlled on the motor
3. it is possible to ON/ OFF motor programmable.

4. Programmable time switch which is use for ON/OFF purpose are made such that, at a one time can program the 10-20 modes of operation.
5. Emergency stoppage system available.
6. Advanced circuit breaker for protection of the line.
- 7.

#### PASSWORD BASED CIRCUIT BREAKER USING ARDUINO

Password Based Circuit Breaker is a simple system that helps in controlling the electrical Nowadays; electrical accidents to the line man are increasing, while repairing the electrical lines due to the lack of communication between the electrical substation and maintenance staff This system gives a solution to this problem to ensure line man safety. In this proposed system, the control (ON/OFF) of the electrical lines lies with line man. This system is arranged in such a way that maintenance staff or

ATMEGA328P is high performance, low power controller from Microchip. ATMEGA328P is an 8-bit microcontroller based on AVR RISC architecture. It is the most popular of all AVR controllers as it is used in ARDUINO boards.

#### How to Use ATMEGA328P

ATMEGA328 is used similar to any other controller. All there to do is programming. Controller simply executes the program provided by us at any instant. Without programming controller simply stays put without doing anything.

#### TIME SWITCH

A time switch (also called a timer switch, or simply timer) is a timer that operates an electric switch controlled by the timing mechanism.

Intermatic introduced its first time switch in 1945, which was used for "electric signs, store window lighting, apartment hall lights, stokers, and oil and gas burners." A consumer version was added in 1952.

The switch may be connected to an electric circuit operating from mains power, including via a relay line man has to enter the password to ON/OFF the electrical line Now, if there is any fault in electrical line, then the line man will switch off the power supply to the line by entering password and comfortably repair the electrical line, and after coming to the substation line man switch on the supply to the particular line by entering the password. Separate passwords are assigned for each electrical lines with the help of a password.

#### IR REMOTECONTROLSWITCH

This system describes a technique of adding the remote control feature to an electrical appliance. The goal is to construct a black box where you can plug in your Ac appliances and control the ON and OFF operations with a TV or DVD remote that uses modulated infra-red (IR) pulse train of 38KHz frequency. The good thing about this system is that it

does not use any microcontroller and is only based on the CD4017 decade counter IC. **Specifications of components**

As said, first we need to program the controller and that is done by writing the appropriate program file in the ATMEGA328P FLASH memory. After dumping this program code, the controller executes this code and provides appropriate response.

Entire process of using an ATMEGA328P goes like this:

Burn the HEX file of written program in ATMEGA328P flash memory using this program.

Disconnect the programmer, connect the appropriate peripherals for the controller and get the system started or contactor; or low voltage, including battery-operated equipment in vehicles. It may be built into power circuits (as with a central heating or water heater timer), plugged into a wall outlet with equipment plugged into the timer instead of directly into the power point; or built into equipment.

The timer may switch equipment on, off, or both, at a preset time or times, after a preset interval, or cyclically. A countdown time switch switches power, usually off, after a preset time. A cyclical timer switches equipment both on and off at preset times over a period, then repeats the cycle; the period is usually 24 hours or 7 days.

Time switches can be used for many purposes, including saving electric energy by consuming it only when required, switching equipment on, off, or both at times required by some process, and home security (for example switching lights in a pattern that gives the impression that premises are attended) to reduce the likelihood of burglary or prowling.

Among applications are lighting (interior, exterior, and street lighting), cooking devices such as ovens, washing machines, and heating and cooling of buildings and vehicles.[3] Built-in automatic washing machine controllers are examples of very complex electromechanical and electronic timers cycles, starting and stopping many processes including pumps and valves to fill and empty the drum with water, heating, and rotating at different speeds, with different combinations of settings for different fabrics.



#### APPLICATION

Street  
Light  
Alarm/  
Bells  
Signboards  
AC Control  
High Mast Lighting  
Water Sprinkling  
Motor / Pump Control  
**Control circuit for timer**

In the control circuit we used 2 time switch one is On Time switch and second is Off time switch.

Supply is connected line terminal of timers and from 3<sup>rd</sup> pine of both timer supply so taken out

The output of first timer is connected to 230v primary side of step-down transformer, it is center tap transformer, of 1 A current rating.

The secondary 12v AC of transformer is connected to bridge wave rectifier

The output of rectifier circuit is connected to 8<sup>th</sup> Vcc pin of 555 timer ic .8<sup>th</sup> and 4<sup>th</sup> reset pin of ic are shorted together. For provide the time delay to relay we used 555timmer ic and connected the 100k ohm resistor and 47micro F capacitor to the ic for providing 0 time delay. The output of ic is taken from pin no. 3 and connected to the relay coil terminals ic and 440v AC supply is given to common pin of both the relays we shorted the common pin and No pin of relay 1 initially .so that when supply is given to the relay common pin is shift to normally close pin from normally open and continues the couple further.

The same connections are done for the 2<sup>nd</sup> off timer also but shorted common pin and NC pin of relay 2 are

shorted initially . When supply is given to the relay coil common terminal is shift to No pin from NC pin and disconnect the further supply

#### Operation

There is constant supply is given to time switch and time of ON & OFF of the motor is programmed previously . When the time of ON is occurs the supply is continue and the output of time switch 1 is given to the step down transformer which will convert 230 volt AC into 12 volt AC that 12 volt AC output of transformer is given to the bridge wave rectifier circuit and the circuit converts 12 volt AC supply into 12 volt dc that 12 volt dc supply is connected to the timer 555 IC the output pin that is Pin number 3 e off 555 timer IC is connected to coil terminal of relay 1 so relay coil get energized and it's IPS the common terminal from normally open To you normally closed pin and supply is continue further for 1 minute as the time set in the timer 1 in the similar way the timer 2 you will operate when it's on time is obtain the main thing is that when the timer to gets on and supply continuous further its results into switching off the motor hence the common pin of the relate to is connected normally closed pin initially and when the supplies give in the relay coil gets energized and the common terminal Swift on normally open pin from normally closed pin and cut off the supply this circuit is having the supply for 1 minute since the time difference between on and off time of time switch for both the timer is 1 minute

#### Password based circuit breaker

##### Construction

Propose system used arduino board for the operation and interfaced it with four channel relay. In the Arduino ATmega328IC used for programming On the arduino board on the left side on ic analog output pins are there namely A0 A1 A2 A3 A4 A5 who takes the output from the ic

On the right side digital pines namely 0 to 13 which are digital input pins. From those pin 2-pin 9 are connected to the matrix keypad pad and pin 10-pin 13are connected to IN 1 - IN4 of 4channel relay respectively . 5V DC input is given to the Arduino board externally . From the 5V pin of ic ,supply is connected to the Vcc pin of both LCD display and 4channel relay by looping .and the ground pin of both of I2C module and of 4channel relay are connected to ground pin of ic by looping.

LCD I2C module have 4pins namely Vcc ,ground SCL and SDL . SCL & SDL pin of I2C module are connected to analog pins of ic A4 & A5.

A0 pin is connected to the buzzer alarm circuit so that if invade password is wrong then it will operate and buzzer will sound, other terminal of this circuit is connected to the ground pin of ic

230 V supply is connected to the common pin of 4channel relay and common pin is shorted with NO pin for all the relay initially NC pin of relay 1 ,2 ,3 ,4 are connected to time switch, 1ø230 V load terminal , DC lock and lighting circuit respectively.

### Working

When 5 V DC supply is connected to the Arduino and initially LCD display shows Enter password .

After entering the password if the password is right then display shows successful and if the password is wrong then display shows wrong password and alarm circuit works to indicate that entered password is wrong

After entering right password the digital signals as given to the ic ATmega328 as the input and ic process the signals and give output in form of analog output and load is operated.

### WORKING OF PROGRAMMABLE ON AND OFF THREE PHASE INDUCTION MOTOR

All the circuit components which we had used in our system the one is the time switch second is a D.O.L. starter this is a circuit diagram for the Programmable control circuit is shown here. time switch take input from a two pin contactor the output of the timer switch given to the step down transformer which transfers 230 volt single phase AC supply into to 12 volt AC and the secondary of transformer is connected to the bridge rectifier to convert 12 volt AC into 12 volt dc the output of this rectifier circuit is fed to the two timer IC first one is for the on timer and second one is for off the timer we used to timer IC that is 555 IC to provide a time delay the value of time delay is selected according to the rating of capacitor and resistor circuit connected to the IC output of IC is given to the 12 volt relay the fore on timer normally open(NO) pin of relay is connected to common so that when the supply is given to relay it shift from normally open(NO) to normal close (NC) for off IC the normally closed(NO) pin of relay is connected to common pin so that when supply is given to relay normally closed (NC) pin shift to normally open (NO) and the circuit is interrupted motor will switched off in this way our Main control circuit is works and perform a major role to control the operation of motor these all are the components which we are used to build our main control circuit

**Time switch features** the features of time switch we had used in our system is it 4 pin time switch provided with battery first two pins of timer are Input and last two pins are output we can set the programs in the timer 24 x it can use in agricultural pump and streak light for hydroponics voltage rating of the time switch is 220 volts to 250 volts frequency is 50 OR 60 Hz and temperature is 0 to 55 degrees Celsius with 30 amperes Current rating.

### PASSWORD CB

Password based circuit breaker in nothing but microcontroller base circuit breaker it means as we insert the password if it is correct then the corresponding relay will open and if it is not then and alarm and LED will indicate that we have entered the wrong password so circuit remains in off position this is a circuit diagram of password based circuit breaker using

arduino this photo is of actual connection of password based circuit breaker this is the components We had used in the circuit.

### IR SENSOR

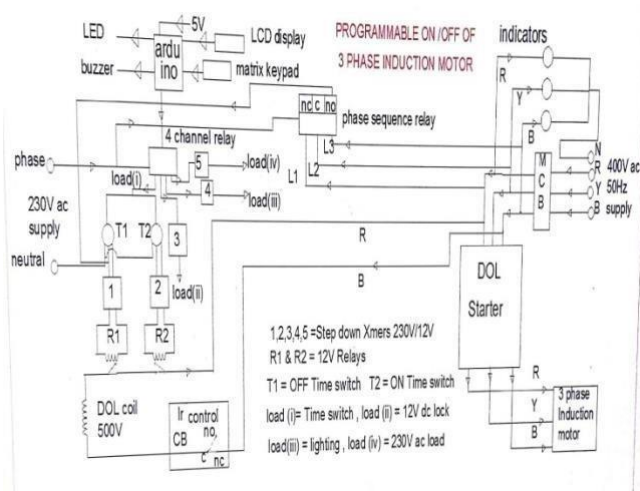
In case of emergency it is not possible to go near to the device and do switch of the machine for that time. we have implemented the emergency IR remote control circuit breaker which will switch off the circuit when motor is running by pressing just remote keys so circuit will be open these all are the components which we had used in the IR remote control based circuit is it is our main circuit diagram for the remote control best switch which we had implemented this is a main circuit construction which we implemented in our system wall construction is shown in this particular photo

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6. Advanced circuit breaker for protection of the line.

### FUTURE SCOPE OF THE SYSTEM

- Now industries are being replaced by automation and Robotics all process and work are carried out by machines which are program for specified device and Robotics process automation
- used India has just tape in Industrial Automation field so now over a period of time IOT and artificial intelligence this type of Technologies will merging with operational Technology like PLC scads DCS Programmable controller and that is the reason future will be prescribed in automation.
- Wide range programming of the time switch
- Additional relay driver, i.e. UNL2003 MOTOR DRIVER
- High security circuit breaker.
- Bluetooth and Wi-Fi operated emergency stoppage. Suitable for all industrial motor (capacity up to 30amp)



### FUTURE EXPANSION OF SYSTEM

- O It is possible to control a line with the help of Bluetooth.
- O We can operate simultaneously single phase and three phase load with the help of one timer

### REFERENCE

- [1] <https://electronicsforu.com/electronic-s-systems/hardware-diy/3-phase-motor-programmable-controlle>