IOT BASED DIGITAL STARTER

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ABSTRACT

The iot-based digital starter control system is designed to provide efficient and remote control suppy to AC motors using ESP32 microcontroller. This system sense the ac current and voltage sensors to monitor real-time electrical parameters. The system is connected to an Android application and a web-based platform, allowing users to control and monitor the motor from anywhere via the Internet. The ESP32 microcontroller facilitates seamless Wi-Fi connectivity. This IoT-based digital starter control system is a smart and efficient solution for industrial, agricultural and domestic applications.

Keyword *: Wi-fi module,Internet Of Things, Parameter Monitoring, AC Motor, Parameter Controlling Etc.*

1. INTRODUCTION

In day to day life motors play a major role in domestic and industrial sector.Irrespective of the type of supply the motors are started using starters.In industrial sectors,manual operation for ON/OFF of the motor may not be reliable.At many instances the operators at control room may not be available to control the motor. Recently the technological growth has paid way for various automatic starters and controllers.This project is about to control the starter through internet. But high rating motors require safe operation. The main objective of this project is to control the motor and to provide proper protection to the motor. Hence in this project it is proposed to model a device which is dynamic, cheap and wireless in the field of motor controlling. Safety of a motor is also a major concern because malfunctioning of a motor can cause a huge loss in production also increase maintenance cost of the motor itself. That's why safety function is included in this project. The system integrates AC current and voltage sensors to continuously monitor electrical parameters and detect abnormalities. A 16x2 lcd display provides real-time information on motor status, while a relay module is used to control the motor's switching operation. The esp32's wi-fi connectivity enables seamless communication between the hardware and user interfaces, including an android application and a web-based platform. The system enhances safety by incorporating overload protection and fault detection mechanisms, preventing potential damage to the motor. In the industrial world, three-phase induction motors are usually monitored by an operator. The operator is in charge of supervising the monitoring of the induction motor while it is operating (Nasution & Hasibuan, 2018).This causes monitoring to be inefficient and requires a lot of time and effort. Therefore we need equipment that can easily and efficiently monitor the temperature, current and voltage of a three-phase induction motor. Efficient measuring instruments can be made with the help of microcontrollers and wireless technology. An integrated monitoring system with the application of connected microcontrollers and sensors, so that it is able to transmit current, voltage and temperature information wirelessly to a cloud server on a computer or smartphone application. This monitoring system is designed by implementing an automatic monitoring system to maintain the performance of a three-phase induction motor.

2. OBJECTIVES

Enable users to remotely start, stop, and monitor the AC motor using an Android application and a web-based platform.Provide real-time updates of motor status through Wi-Fi connectivity by using the ESP32 microcontroller.Integrate AC current and voltage sensors to measure electrical parameters and display real-time data on a 16x2 LCD screen.Implement overload protection to prevent motor damage due to excessive current.

3. LITURATURE SURVEY

1. **Patil Akash, Mandle Chetan:** This project is to control the starter from the application and to provide a start motor The starter is turned on/off from the application itself through a Wi-Fi module The webpage is created through which the starter on/off status can be identified and the motor can be turned on/off. "IOT based motor starter" CONTROLVolume:03/Issue:05/May-2021

2. **Dr. G. P. Ramesh, Ranjudha, Ajay Krishnan S M:** The system measures voltage, current, power, and energy consumption, displaying real-time data on a 16x2 LCD and the Blynk mobile application. "Design and implementation of iot based electricity metering system" International Journal of Electrical and Electronics Research April - June 2019

3. **Jayanta Gohate, Payal Kutemate:** The system measures AC voltage and current, calculates power consumption, and provides real-time monitoring through the Blynk 2.0 platform and Telegram bot integration, enabling remote access via Android applications and web interfaces. "Basics of iot based current, voltage & temperature, monitoring system" International Journal of Advanced Research in Computer and Communication Engineering 4, April 2023

4. **R S Gaikwad:** The system measures AC voltage and current, displaying the data on a 16x2 LCD. While the project does not explicitly mention Android app integration, the ESP32's Wi-Fi capabilities allow for potential remote monitoring and control through web applications. "IOT Based Smart Meter Using Esp32" International Journal of Research Publication and Reviews May 2024

4. WORKING

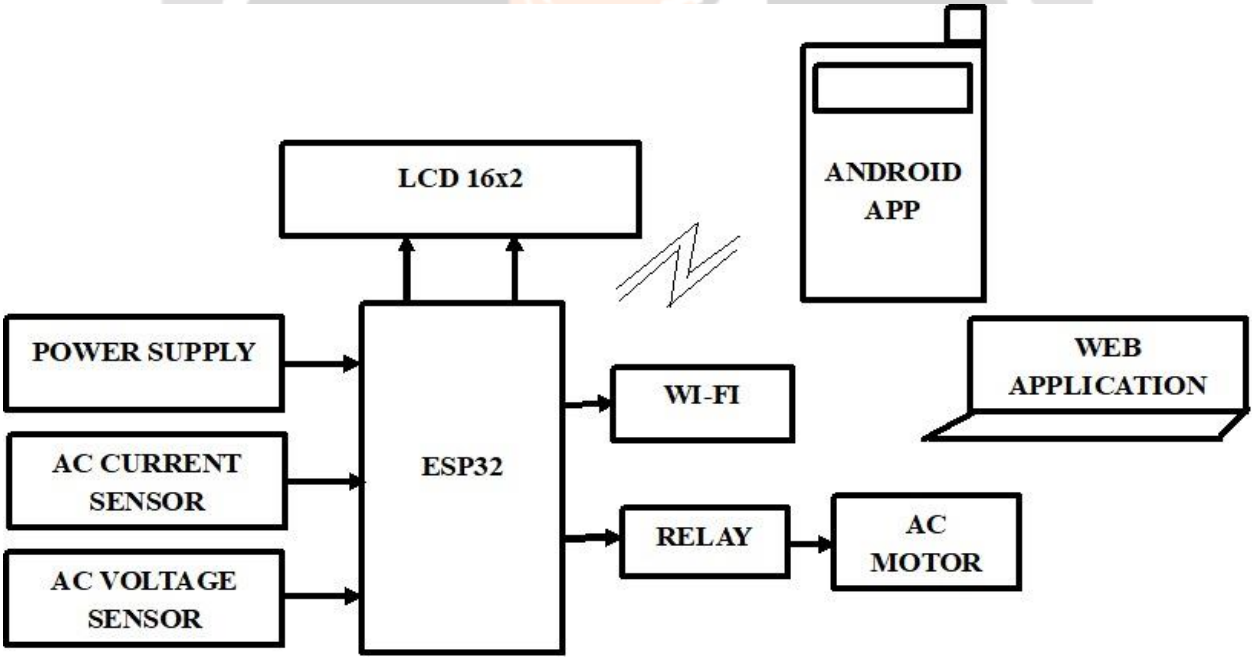


Fig1.Block Diagram

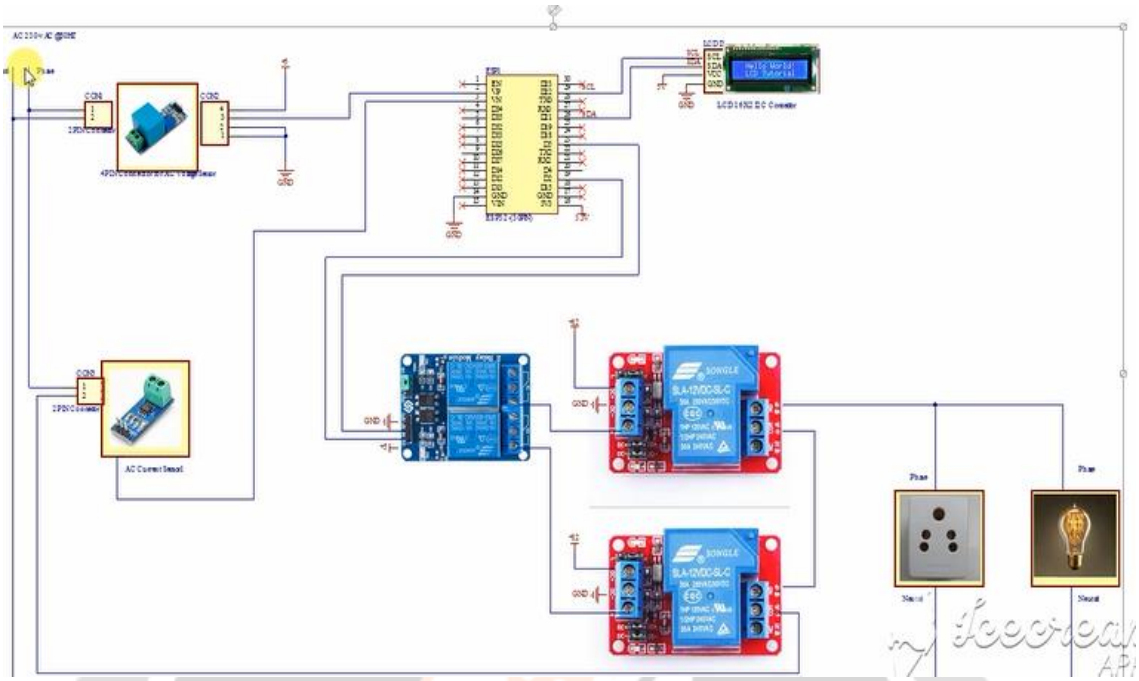


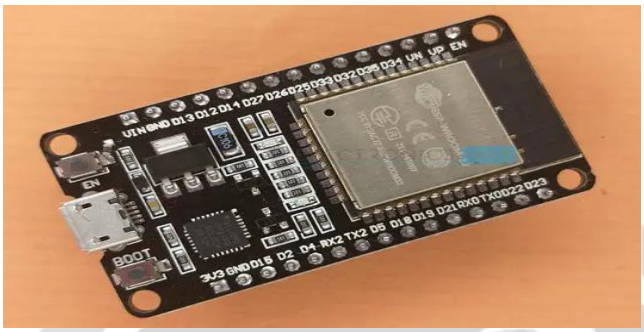
Fig 2.Circuit Diagram

IoT Based Motor Starter Control: The main objective of this project is to control the starter. The control is done by wireless signal transmission.
Motor Control: The starter can be turned on or off by using the button which is created on a webpage. The signal is transferred to the receiving side through a Wi-Fi module which is connected to Node MCU. The starter is turned on or off based on the signal.
On/Off State Detection: The signal received from the webpage enables the Node MCU which in turn operates the relay through the driver circuit. The relay thus controls the on/off state of the starter depending upon the signal received.
Motor Protection: The voltage and current sensor's output is given as feedback to the ATMEGA328P- PU. If the current or voltage exceeds the specified limit then the relay will automatically cut off the starter.
The iot-based digital starter control system operates by integrating various sensors, actuators, and a microcontroller (ESP32) to enable real-time monitoring and remote control of an AC motor. The system is designed to automate motor operations and provide protection mechanisms, making it suitable for industrial and agricultural applications. Esp32 acts as the central processing unit, handling sensor data, user commands, and communication via wi-fi. AC Current Measures the current drawn by the AC motor. AC Voltage Monitors voltage levels to detect fluctuations and ensure safe operation. Relay is Controls the ON/OFF operation of the AC motor based on user commands. Displays real-time voltage, current, and motor status information. Android app and web application are allowing users to remotely monitor and control the motor via the internet.

5. COMPONENTS

1. ESP32 Microcontroller
2. LCD 16x2
3. Relay
4. AC Current Sensor
5. AC Voltage Sensor
6. AC Motor

1. **ESP32 Microcontroller**
   dual core MCU from Espressif Systems with integrated Wi-Fi and Bluetooth. If you worked with ESP8266, then ESP32 is a significant upgrade with a lot more features. This Getting Started with ESP32 guide is for complete beginners, with or without prior experience in IoT or ESP8266.



2. **LCD 16x2**
   In LCD 16×2, the term LCD stands for Liquid Crystal Display that uses a plane panel display technology, used in screens of computer monitors & TVs, smartphones, tablets, mobile devices, etc. Both the displays like LCD & CRTs look the same but their operation is different. Instead of electrons diffraction at a glass display, a liquid crystal display has a backlight that provides light to each pixel that is arranged in a rectangular network.

LCD 16 X2

3. **Relay**
   A Relay is a simple electromechanical switch. While we use normal switches to close or open a circuit manually, a Relay is also a switch that connects or disconnects two circuits. But instead of a manual operation, a relay uses an electrical signal to control an electromagnet, which in turn connects or disconnects another circuit.

4. AC Current Sensor

AC current sensors are devices used to measure alternating current (AC) in electrical systems. Here are some key points:

Types: AC current sensors include transducers that can measure currents up to 200 A and convert them into analog signals.

Applications: They are widely used in power metering, load control, and monitoring systems.

5. AC Motor

An AC motor is an electric motor driven by an alternating current (AC). The AC motor commonly consists of two basic parts, an outside stator having coils supplied with alternating current to produce a rotating magnetic field, and an inside rotor attached to the output shaft producing a second rotating magnetic field. The rotor magnetic field may be produced by permanent magnets or DC or AC electrical windings.

6. ADVANTAGES

- Remote monitoring & control
- Real-time data monitoring
- Improved safety & protection
- Automation & smart operation
- Energy efficiency & cost savings
- Elimination of timer circuit since exploitation online timer.
- is employed by everybody with simply the information of the text
- Installation of the app not necessary the user will operate the starter by exploitation and web site there's no ought to install the applying.

7.APPLICATIONS

- Industrial applications
- Agricultural applications
- Commercial applications
- Residential applications
- Domestic applications

8.CONCLUSION

Thus the project is created to control a starter through Wi-Fi Module. The Node MCU receives the signal from the web server either to turn on/off the starter. The starter can be turned on/off through the relay driver circuit. The voltage and current sensors are given as a feedback signal to Node MCU for the protection of the motor. Node MCU is programmed in such a way that whenever the current and voltage exceeds above or below the specified value the relay will automatically cut off and the motor stops.

9.REFERENCES

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