



Smart Industrial Load Switch

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ABSTRACT

The project's goal is to implement a smart switching system to control electrical load in a dangerous industrial environment. Traditional switches generate sparks, which can be hazardous in industries comprising of various sectors. It is generally ideal to choose a control system with a smart approach in a situation like this, as it will turn off automatically when the sensor detects. The Arduino board, current sensor, bulbs, and Wi-Fi module enable the deployment of a smart system that allows for the remote control of a load and the display of an alert message on a mobile device.

Literature Survey

S. N O.	Name of the Journal	Name of the Author	Title of the paper	Description
1.	Journal For Research in Applied Science and Engineering Technology	Ankush Meena , Arpit Gangwal , Himanshu Vijay , Chetan Prajapat , Jitendra Singh	Touch Controlled Switch Board with Multiple Load Switches	In this paper we learn that people are setting a priority on their security and safety, where they use the concept of a switch that can be activated and deactivated by touching a TTP223 module rather than a standard switch. which guard us against shocks. This circuit can be used in moist regions, industries, electrical doorbells, and toys ,but requires human involvement for operation.
2.	International Journal of Engineering Science and Generic Research	Shreya Sankrityayan, Ananya Sankrityayan	Touch Screen Based Industrial Load Switching	From this study, we can deduce that the complexity of the circuitry is increased by the number of hardware components employed in the touch method. Microcontrollers, diac or triac, opto-isolators, and transformers are used.
3.	Journal of IoT in Social, Mobility, Analytics & Cloud	Sejal Bagde, Pratiksha Ambade, Manasvi Batho , Piyush Duragkar, Prathmesh Dahikar , Avinash Ikhar	Internet of Things (IOT) Based Smart Switch	In this perspective, the proposed research work has developed an Android application with a unit comprising of ESP8266 Wi-Fi module, relay, logic level converter module, capacitive touch sensor module and also a Wi-Fi technology has been used to control the switches.

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4.	International Journal of Scientific Research in Computer Science, Engineering and Information Technology	Sahil Saini Neha Bharti Sunikshita Katoch	Industrial Automation using with Programmable Switching Control	The switching of industrial loads using a user programmable logic control device for sequential operation is demonstrated in this paper. This operation is typically used for repetitive tasks. For simple operations like sequential switching of loads, programmable logic controllers used in industrial applications are extremely expensive. It operates in three modes.
5.	Energy System Engineering, Indian Institute of Technology, Bombay, India	S Ashok, R Banerjee	Load-management applications for the industrial sector	Here the goal of the load-management system is to keep the load as constant as possible, allowing the system load factor to approach 100%. The best features of load management are lower maximum demand, lower power loss, better equipment utilisation, and lower maximum demand charges.It requires more energy.

OBJECTIVE

The main motive of this project is to detect the load of equipment and if it exceeds a predetermined threshold value , an action is to be taken. When an overload arises in an industry, it takes human involvement to turn it off. Yet, handling a heavy load could cause sparks and be quite risky. In order to avoid the human involvement required by the touchscreen-based switch, we are introducing smart industrial load switching, in which the function is carried out automatically and without humans. This aids in lowering errors and raising accuracy. In order to address industrial issues, the touch is being upgraded to smart.

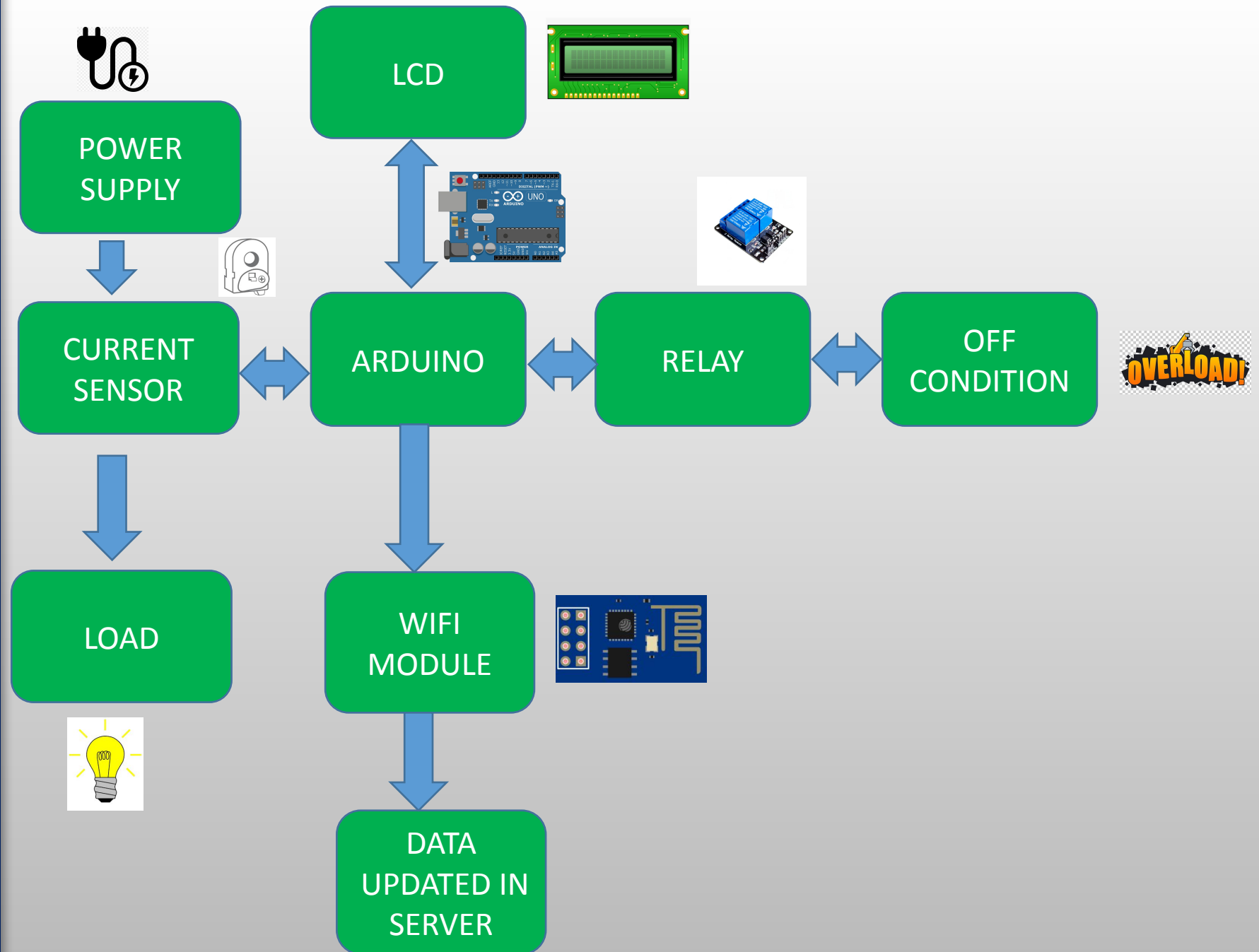
PROBLEM IDENTIFICATION

The challenge of electrical load control, especially with touchscreen-based switching systems, is dangerous for industrial environments. Conventional switches also cause sparks, which can be hazardous in sectors with lots of workers, machines, and equipment. It is usually essential to choose a control system with smart switching in such a situation. This kind of system simplifies processes and lowers errors.

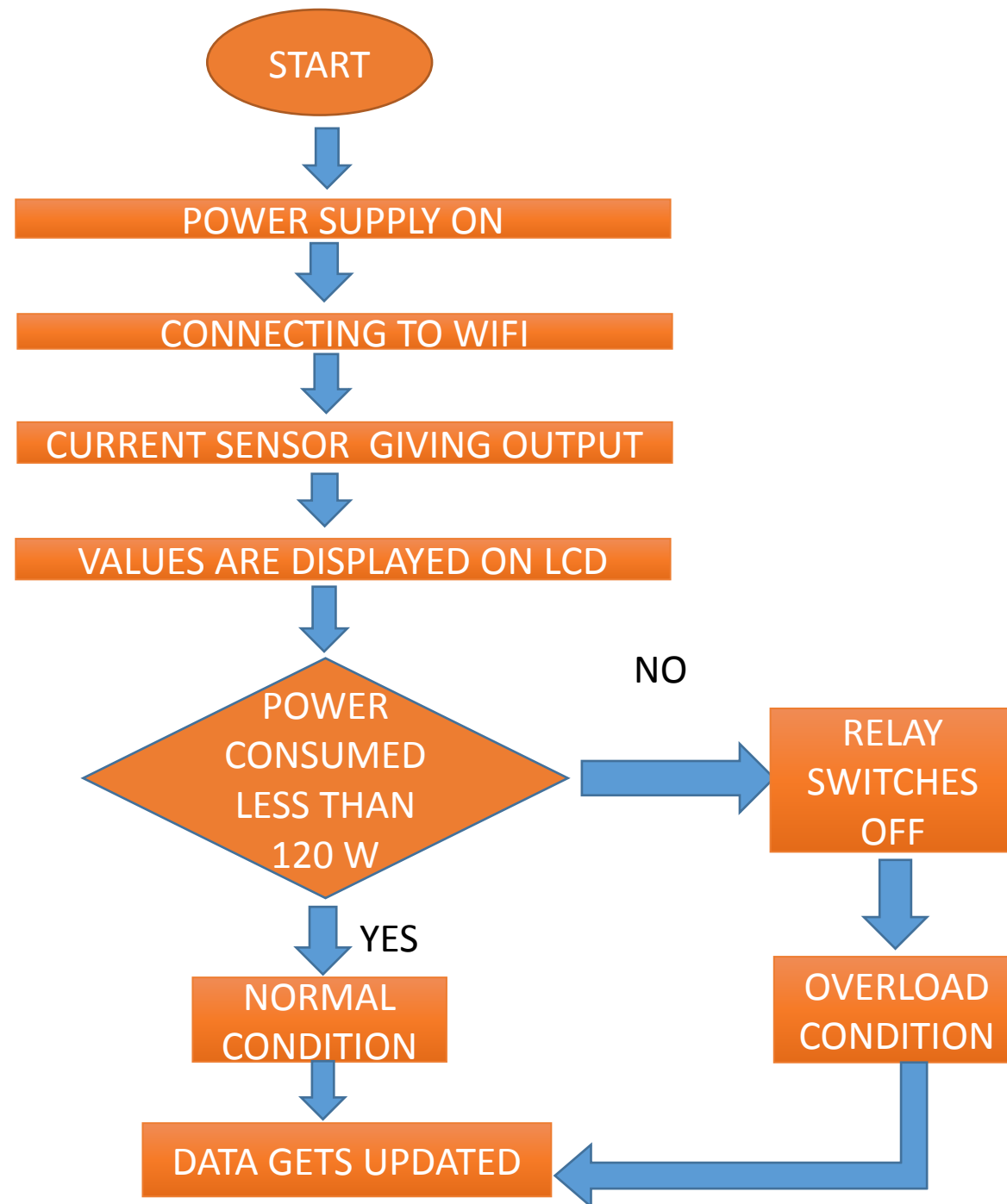
INTRODUCTION

As technology is advancing so industries are also getting smarter. Modern industries are gradually shifting from conventional switches to the centralized control system. The Smart Industrial loading switching is a method where the load when deviated gets switched off automatically. This method is the contrary approach to the conventional and touch screen method. Here, the IOT concept is used to convert it into a smart solution. The current sensor senses the load value and the bulbs are connected to show the current status. Apart from this, a Wi-Fi module helps to receive a message on phone to monitor remotely.

BLOCK DIAGRAM



METHODOLOGY

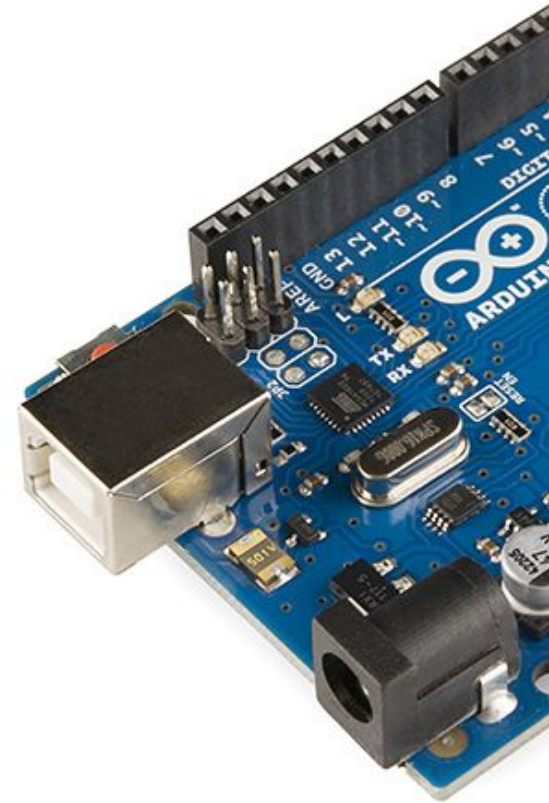


HARDWARE COMPONENTS

1. Arduino Uno
2. Relay
3. Current Sensor
4. Wifi Module

Arduino Uno

1. The Arduino Uno R3 SMD is being used.
2. Board is based on the ATmega328P microcontroller.
3. Built-in voltage regulator that allows it to be powered with a voltage between 7V and 12V.
4. In this 9 Digital pins, 3 Analog pins , Ground and power supply are used.



Relay

1. It serves as the main switching to control power supply.
2. Miniaturised.
3. Overload protection mechanisms.
4. The Input Voltage is 12V DC Relay
5. Rating 10A



Current sensor ZMCT103C

1. Capable to measure a current level upto 5-10A
2. The module has 4 output pins and provides an analog output corresponding to the AC current passing through the wire.
3. ZMCT103C is a small size, high accuracy module
4. Input Voltage 230 volts
5. It is an AC Current sensor.



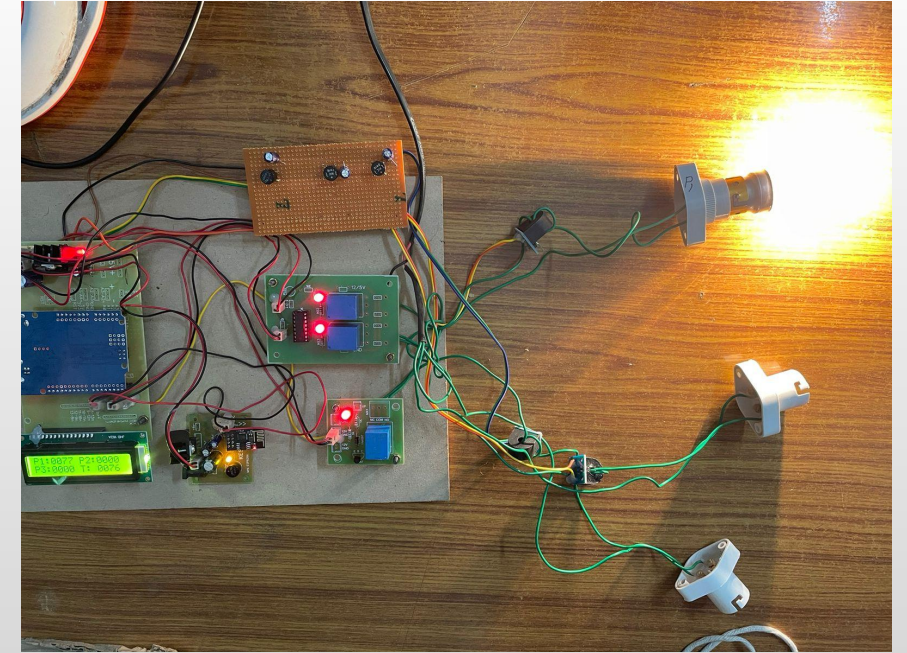
Wifi Module

1. It operates at 3.3V power supply.
2. Built-in RAM for data storage and Execution.(32kb)
3. Connects devices up to 12m.
4. The current consumption is 100A
5. Compact size and very low price.



RESULT

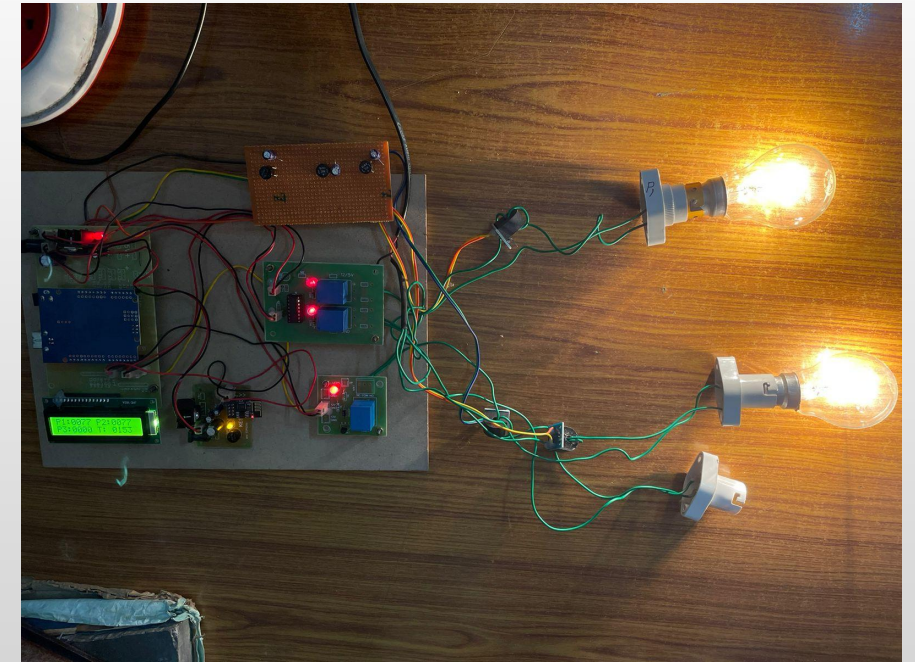
Each bulb here is of 60W. When the first load is placed, it doesn't cross the threshold which is 180W. And so the bulb continues to glow.



HARDWARE IMPLEMENTATION

RESULT

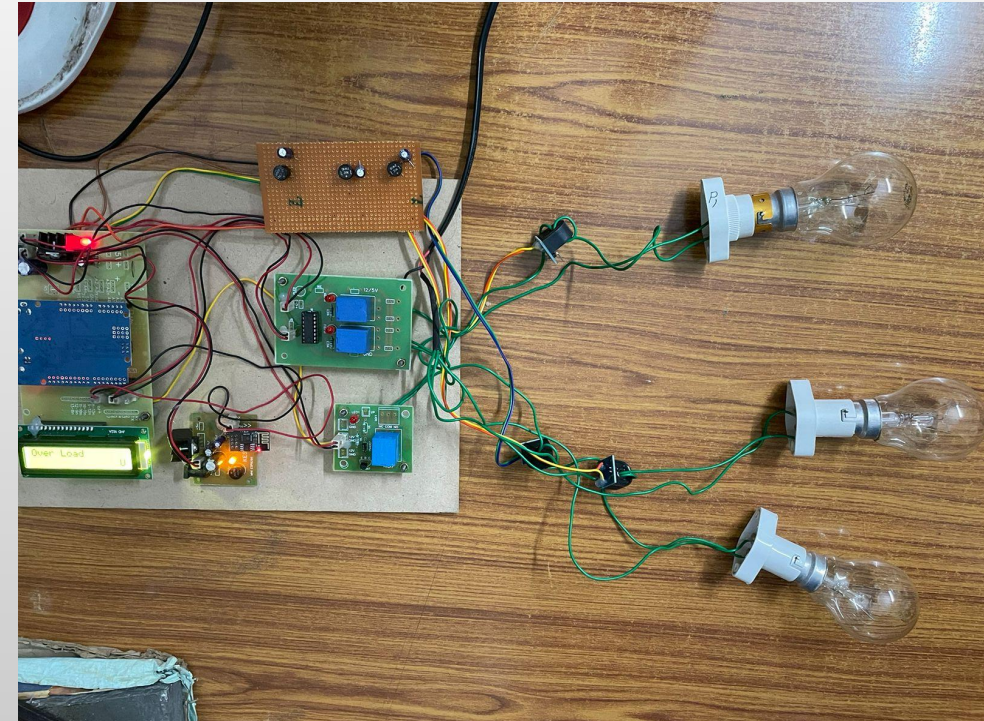
When the second load is placed , it still does'nt cross the threshold which is 180W. And so the bulb continues to glow.



HARDWARE IMPLEMENTATION

RESULT

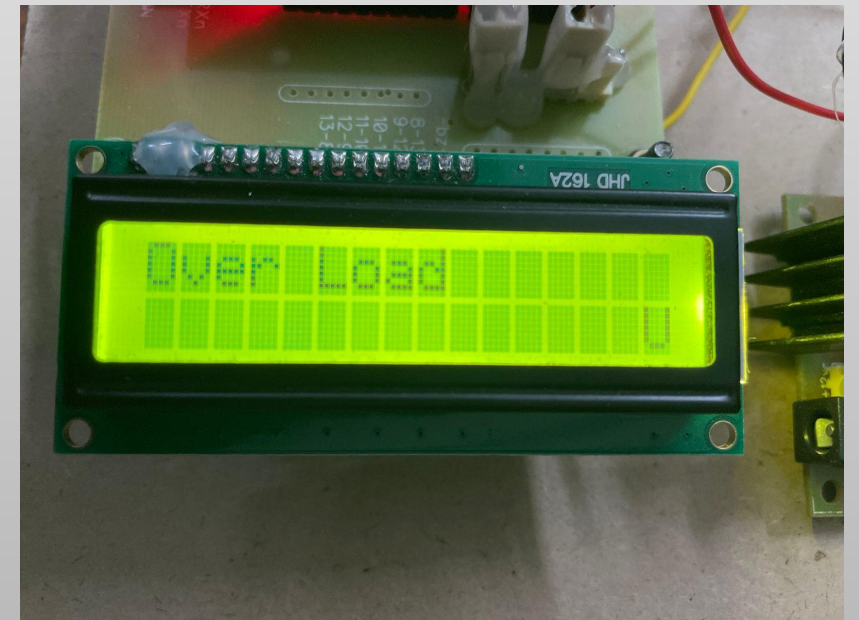
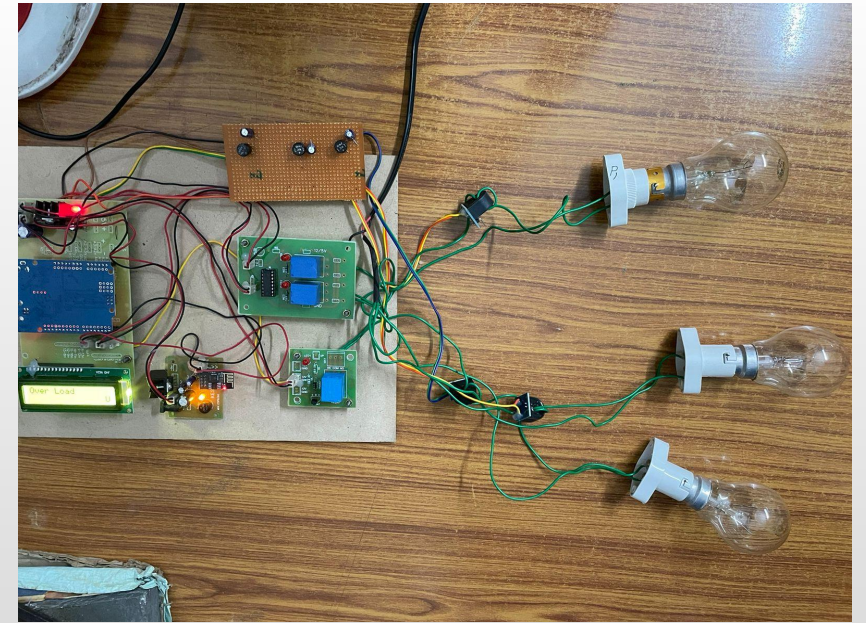
When all the three loads are placed , the power drawn is greater than 180W, hence overload condition arises .The relays then switch it off immediately.

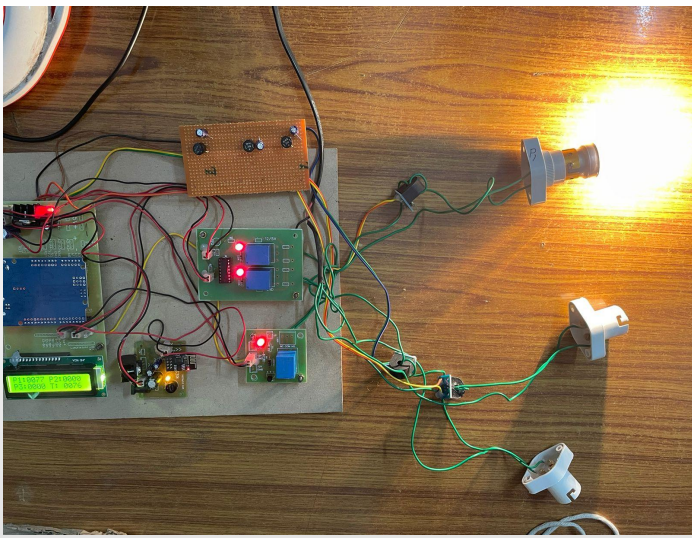


HARDWARE IMPLEMENTATION

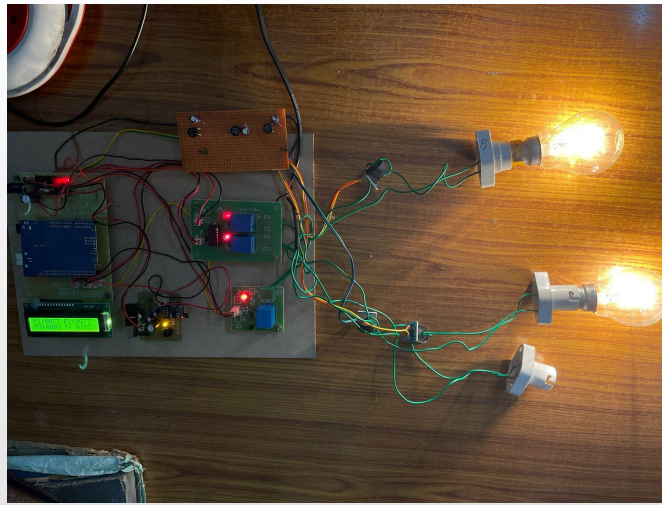
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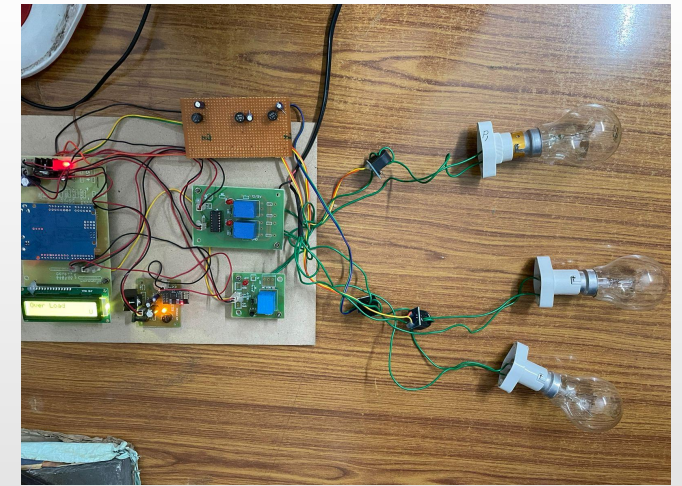




- Each bulb here is of 60W.
- When the first load is placed , it doesn't cross the threshold which is 180W.
- The bulb continues to glow.



- When the second load is placed , it still doesn't cross the threshold which is 180W.
- The bulb continues to glow.



- When all the three loads are placed , the power drawn is greater than 180W.
- Hence overload condition arises .The relays then switch it off immediately.

RESULT

This data then gets updated to the server, where we can monitor remotely and take the necessary action required.
The perk of this is that it shows the current status of the load.

S.No	Power1	Power2	Power3	Total	Status
1	76	77	0	153	Normal
2	76	0	0	76	Normal
3	77	77	51	205	Over_Load
4	76	77	80	233	Over_Load
5	76	77	0	153	Normal
6	76	0	0	76	Normal
7	77	0	0	77	Normal

CONCLUSION

To solve this real time industrial problem we are implementing a smart industrial load switching method. This is a more modern method of switching than traditional and touch screen-based switching. Not only does it monitor, but it also assists us in turning off automatically. This system assists us in reducing errors and producing a consistent and desired output. The current load is displayed on the mobile to take the necessary action.