International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 08 Issue: 09 | Sept - 2024 SJIF Rating: 8.448 ISSN: 2582-3930

INDUSTRIAL DEVICE CONTROL USING WI-FI MODULE

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Abstract

This paper presents a design and prototype implementation of new industrial automation system that uses Wi-Fi technology as a network infrastructure connecting its parts. The proposed system is better from the scalability and flexibility point of view than the commercially available industrial automation systems. In Industry we have different types of loads at different locations. We can control all loads at a same time from one place (control room) without connecting any physical wire between loads and control room, in this paper we are using WI-FI module, IOT, relay, voltage sensor, current sensor, speed sensor. In this paper Wi-Fi is being used by phone and the loads are operated with it. In this paper we should not connect AC loads directly to microcontroller since AC may enter into controller due to this our controller may be destroyed. To avoid such type of drawback we need some drivers. In this paper weare using relay as load controller.

Key word: Sensor, Microcontroller, IOT, Motor, Relay

1. Introduction

The paper's primary objective is to optimize energy consumption in industrial operations through real-time monitoring and control of industrial loads. The paper uses various sensors, including temperature sensors, motion sensors, and flame sensors, to monitor energy consumption and detect any anomalies in industrial operations. The data collected from these sensors is then transmitted to a central server using Wi-Fi or cellular networks, where it is analyzed using machine learning algorithms. The algorithms provide insights into the efficiency of industrial processes and enable remote control of industrial machines, optimizing energy consumption and reducing costs.

One of the significant advantages of the paper is its potential to improve the safety of industrial operations in Bangladesh. Bangladesh has a history of industrial accidents, including the 2013 Rana Plaza collapse, which claimed the lives of over 1,000 workers. The "IoT Based Industrial Load Monitoring and Controlling System" paper's sensors can detect flame activity and gas activity, alerting workers and management to potential hazards and enabling them to takeimmediate action to ensure the safety of workers.

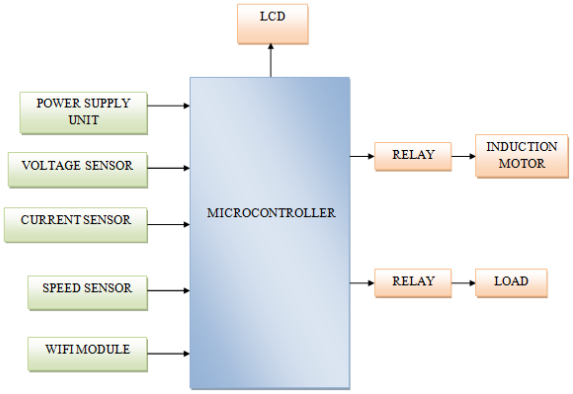
The paper's impact on the industrial sector in Bangladesh is significant, with the potential to improve efficiency, reduce costs, and enhance sustainability. The paper can optimize energy consumption in industrial operations, reducing the carbon footprint of industrial processes and contributing to the sustainable development of the industrial sector. The paper's impact on efficiency can also contribute to the growth of the industrial sector in Bangladesh, making it more competitive in the global market.

2. Proposed System

Previously, the loads (Bulb, Fans, Motors etc…) in industry are controlled manually, it will increase cost and time. In order to overcome these difficulties we are proposing a new method by using Internet of Things (IoT). By connecting all the loads in industry to a WiFi network and switching ON andOFF through mobile phone where mobile hotspot is used as a Wi-Fi network. Different loads in the paper are dc motors.

To control these motors we are using Blynk app and Node MCU. Node MCU is a device which contain inbuilt Wi-Fi module. Currently industrial motors and engines are controlled using IoT,their speed and other parameters are not being controlled. This application can be further extended to control the speed and other parameters of the motors. Detecting the errors in the engines and motors can also add some advantage if applied.

3. Block diagram



Fig,No: 3.1 Block Diagram Industrial Device Control Using Wi-Fi Module

4. Circuit Diagram

Previously, the loads (Bulb, Fans, Motors etc…) in industry are controlled manually, it will increase cost and time. In order to overcome these difficulties we are proposing a new method by using Internet of Things (IoT). By connecting all the loads in industry to a WiFi network and switching ON andOFF through mobile phone where mobile hotspot is used as a Wi-Fi network. Different loads in the paper are dc motors. To control these motors we are using Blynk app and Node MCU. Node MCU is a device which contain inbuilt Wi-Fi module. The block diagram is shown below.

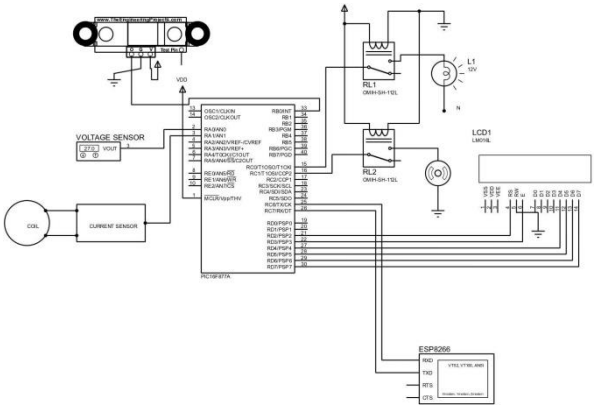


Figure No 5.1 Circuit Diagram

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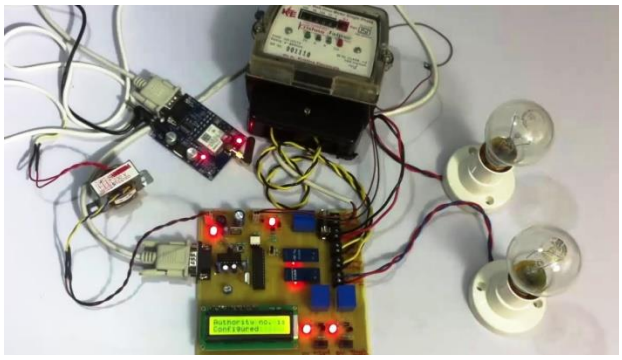
5. Program

```
#include<pic.h>
CONFIG(0X3F31);
#include"Lcd4.h"
#include"serial.h"
#include"pic_adc.h"
#define device1 RC0
#define device2 RC1
unsigned char rec[10],
val=0;
unsigned char iot[25]=0;
unsigned int msec,sec,voltage,current,speed,s;
void iot_send();
void Received();
void interrupt timer1()
{
if(TMR1IF==1)
{
msec++;
TMR1IF=0;
if(msec>20)
{msec=0;sec++;}
}
if(INTF==1)
{
INTF=0;
speed++;
```

```
}
if(RCIF==1)
{
rec[val]=RCREG;RCIF=0;
if(rec[0]=='*'){val++;}
}
}
void main()
{
TRISA=0xff;  TRISB=0x01;  TRISC=0xc0;
TRISD=0x00;  TRISE=0x01;  PORTB=0x00;
PORTC=0xc0; OPTION = 0x07;GIE=1;
PEIE=1;
TMR1IE=1;  //  INTERUPPT
ENABLE TMR1H=60;  //  MSB  TIMER
VALUE UPLOADTMR1L=235;
                  //lSB TIMER VALUE
UPLOAD T1CON=0X00;  //PRESCALER
TMR1ON=1;  // TIMER OFF
Lcd4_Init();
Lcd4_Display(0x80," IOT INDUDTRIAL ");
Lcd4_Display(0xc0,"MONITOR CONTROL");
Delay(65000);Delay(65000);
Delay(65000);
Lcd4_Command(0x01);
Serial_Init(9600);
Receive(1);while(1)
{
voltage=Adc8_Cha(0);
 current=Adc8_Cha(1);
current=current*10;
Lcd4_Decimal2(0xCe,sec);
Lcd4_Display(0x80,"VS:");
Lcd4_Decimal3(0x83,voltage);
Lcd4_Display(0x87,"SP:");
Lcd4_Decimal4(0x8a,s);
Lcd4_Display(0xC0,"CS:");
Lcd4_Decimal3(0xC3,current);
Received();
if(sec>=5)
{
s=12*speed; if(s>1200){s=991;}
Lcd4_Decimal4(0x8a,s);iot_send();
sec=0; speed=0;
}
}
}
void Received()
{
// Lcd4_Decimal2(0x8b,val);if(val>2)
{
Receive(0); if(rec[1]=='1')
{
if(rec[2]=='N')
{
device1=1;
}
if(rec[2]=='F')
{
device1=0;
}
}
if(rec[1]=='2')
{
if(rec[2]=='N')
{
sec=0;device2=1;
}
if(rec[2]=='F')
{
device2=0;
}
}
val=0; Receive(1);
}
}
void send_data3(unsigned int val)
{
      unsigned char val1; Serial_Out((val/100)+0x30);
val1 = val%100;val1 = val1/10;
  Serial_Out(val1+0x30);  val1  =  val%10;
Serial_Out(val1+0x30);
}
void send_data4(unsigned int val)
{
unsigned int ans1,ans2,ans3,ans4,a,b;ans1=val/1000;
a=val%1000;ans2=a/100;
b=a%100;
ans3=b/10;  ans4=b%10;  Serial_Out(ans1+0x30);
Serial_Out(ans2+0x30);  Serial_Out(ans3+0x30);
Serial_Out(ans4+0x30);
}
void iot_send()
{
```

```
// Serial_Conout("*");send_data3(voltage);
if(voltage>240){Serial_Conout("OVERVOLTAGE");
Lcd4_Display(0xc8,"H_VLT");
 }
else if(voltage<200)
{Serial_Conout("LOW VOLTAGE");
Lcd4_Display(0xc8,"L_VLT");
}
else{Serial_Conout("NORMAL VOLTAGE ");
Lcd4_Display(0xc8,"N_VLT"); }
Serial_Conout(":");
send_data3(current);
Serial_Conout(":");
send_data4(s);
// Serial_Conout("#");
}
```

6. Hardware Module



7. Conclusion

In conclusion, the IoT based industrial load monitoring and controlling system developed in this paper provides an effective solution for industrial automation and safety. By utilizing the ESP32 microcontroller, the system is capable of monitoring and controlling various parameters such as load current, temperature, motion, and flame activity. The system is also designed to provide real-time updates to users via a mobile app, enhancing accessibility and ease of use. Through the hardware implementation and testing, it was found that the system operates reliably and accurately, delivering precise measurements and quick response times. The hardware design challenges associated withdeveloping the system were overcome by using a combination of commercially available components and custom-designed circuitry. The paper has significant industrial and social impacts, with the potential to improve workplace safety and efficiency while reducing downtime and energy consumption. The system is particularly relevant in the context of Bangladesh, where industrial accidents and power outages are common occurrences.

The paper builds on existing research on IoT technology and its applications in industrial settings. The literature review identified several key challenges and opportunities associated with IoT-based systems, including issues of scalability, security, and interoperability. Overall, this paper represents a successful implementation of an IoT- based industrial load monitoring and controlling system, with practical applications in a range of industrial settings. With further development and refinement, the system has the potential to make a significant impact on workplace safety, efficiency, and productivity.

8. Bibliography

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