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INDUSTRIAL LOAD MONITORING AND CONTROL

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Abstract - In this project, a solution is proposed for the traditional monitoring and controls of Industrial applications through the implementation of Internet of things(IOT).
This system will monitor and control the industrial machines from any distance in the world using an IOT webpage. So status of machines can be monitor &control anytime and from anywhere using internet.Proposed system is connected to internet using WiFi module & control themachines with the help of relays.All operation is controlled using microcontroller Atmega328 and process canbe seen on 16x2 LCD display.Whereas machineries can also be controlled from switch board. Completesystem will be powered through 230V AC and 5V DC power supply.

Introduction:

Industrial Internet of Things (IoT) is the best way of connecting industrial machineries and sensors, to each other, over the internet, allowing the authorized user of the industry to use information from these connected devices to process the obtained data in a useful way. The IoT architecture includes latest technologies such as computers, intelligent devices, wired and wireless communication and cloud computing [1]. Previously Bluetooth and RF (Radio Frequency) technologies were used to control and monitor the industrial applications but were limited to short distance [2]. Solution to the short distance communication is the IoT based industry automation. Here we can have controlling as well as monitoring from anywhere in the world. However, wireless communication techniques like radio frequency control are generally restricted to simple applications, distances and data security [4].

In this project, a solution is proposed for the traditional monitoring and controls of Industrial applications through the implementation of Internet of things (IOT). This system will monitor and control the industrial machines from any distance in the world using an IOT webpage. So status of machines can be monitor & control anytime and from anywhere using internet. Proposed system is connected to internet using WiFi module & control the machines with the help of relays. All operation is controlled using microcontroller Atmega328 and process

can be seen on 16x2 LCD display. Whereas machineries can also be controlled from switch board. Complete system will be powered through 230V AC and 5V DC power supply.

Need of project:

Previously Bluetooth and RF (Radio Frequency) technologies were used to control and monitor the industrial applications but were limited to short distance. However, wireless communication techniques like radio frequency control are generally restricted to simple applications, distances and data security. Since today is the generation of smart phones, people prefer smart work. Same goes with the industries. Some industries are fully automatedwhile other are partially automated. [5]

Objectives of Project:-

Objectives of the system are:

- Must be able to control monitor status of machines from anywhere
- Accessibility to turn on/off machines through webpage
- To provide facility to control machineries locally, using switches
- Any type of load should be controlled
- It should be easy to replace the attached loads with another machines
- To provide 24x7 monitoring and control

1.2 Organization of Project:-

- Chapter 1 Introduction gives overall idea about concept to be implemented, need of project and objectives behind the project.
- Chapter 2 Literature survey consists of study on various papers published in international/national/journals and conferences related to the project. Availability and selection of development tools.

- Chapter 3 System Development shows project specifications & block diagram followed by description of system blocks. It also contents information of development tools used.
- Chapter 4 System Design consist calculations and design of circuit diagram of system and PCB layout design. This chapter also covers Project Completion Plan and cost of

the material.

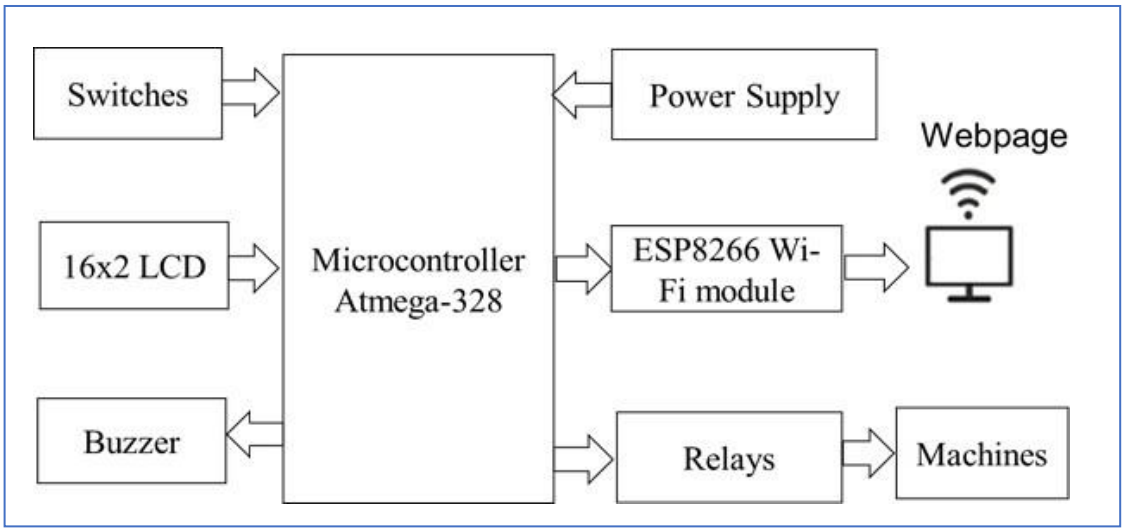
- Chapter 5 gives the ides about overall conclusion about the work done till now, advantages, applications and future scope.

LITERATURE SURVEY:

Geetesh Chaudhari [1] "Industrial Automation using sensing based application"-The system makes use of microcontroller and various sensors to control the industrial devices using Bluetooth. Ashwini Deshpande [2] "Industrial Automation using Internet of Things"-The industrial devices are controlled using cloud server which alerts the admin about uneven conditions using Bluetooth. Bhosale Kiran[5] developing a system which will automatically monitor the industrial applications and generate Alerts/Alarms or take intelligent decisions using concept of IoT. Safety from leaking of raw gas and fire are the most important requirementsof home and industries security system for people. A traditional security system gives the signals in terms of alarm.

"IOT based power monitoring system and control"[9] has approach to design anefficient and real-time wireless networks to monitor power consumption of electrical appliances. A sensor is set at the heap to ascertain current, a circuit is utilized to figure voltage and with these two, power can be computed. Control qualities are put away in clouddatabase. A web facilitating and space is made to get the orders from android application and send them to raspberry pi board at load, which triggers an electromagnetic transfer to change the condition of the heap. This project permit to get the power values and control gadgets from anyplace on the planet.

BLOCK DIGRAM:



SYSTEM BLOCK DIGRAM

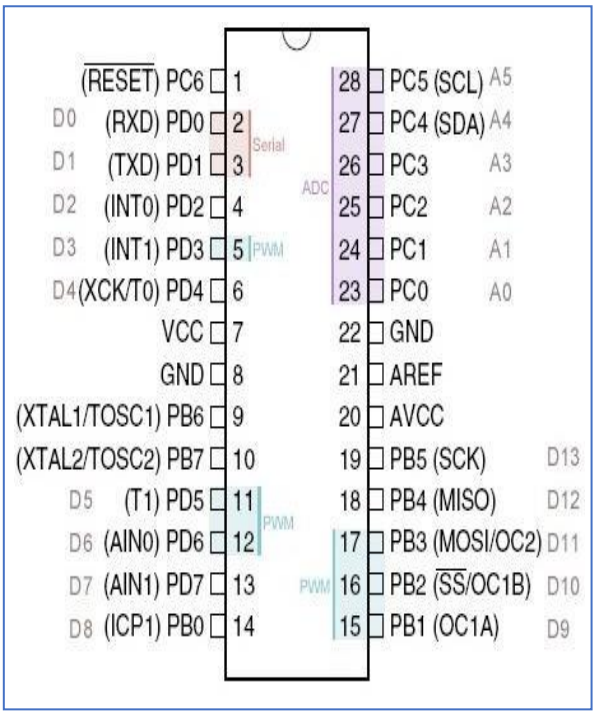
3.1 Description of Blocks:

3.1.1 Microcontroller ATmega328:

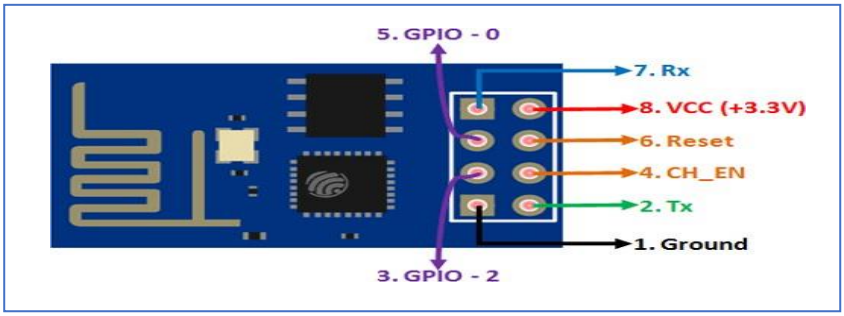
To control complete operation of system, a microcontroller is needed. Atmega328 microcontroller is the best suitable option for proposed system due to availability of required pins and easy and open source development tools.

Features:

- 28 pin IC with 20 GPIO pins
- Inbuilt 6 channel ADC
- 2kb SRAM, 1kb EEPROM
- 32 General purpose registers
- Works on 5V
- Low power Sleep mode
- Multiple software tool support



Wi-Fi Module:- The ESP8266 Wi-Fi Module is a self-contained SOC with integrated TCP/IP protocol stack that can give any microcontroller access to your Wi-Fi network. The ESP8266 is capable of either hosting an application or offloading all Wi-Fi networking functions from another application processor. Each ESP8266 module comes pre-programmed with an AT command set firmware, meaning, you can simply hook this up to your Arduino device and get about as much Wi-Fi-ability as a Wi-Fi Shield offers (and that's just out of the box)! The ESP8266 module is an extremely cost effective board with a huge, and ever growing, community. This module has a powerful enough on-board processing and storage capability that allows it to be integrated with the sensors and other application specific devices through its GPIOs with minimal development up-front and minimal loading during runtime. Its high degree of on-chip integration allows for minimal external circuitry, including the front-end module, is designed to occupy minimal PCB area.



Specifications:

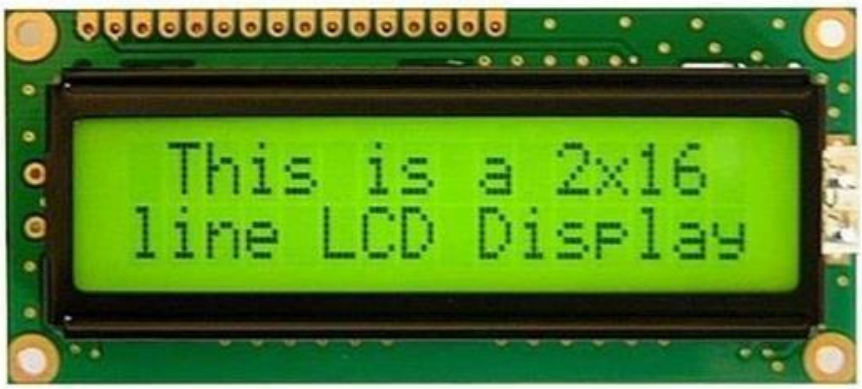
- Power Supply: +3.3V
- Current Consumption: 100mA
- Built-in low power 32-bit MCU
- Supports Deep sleep (<10uA)
- Works on serial communication protocol
- Can be used as Station or Access Point or both combined
- Programmed using AT-commands

3.1.2 LCD16x2:

16×2 LCD is named so because; it has 16 Columns and 2 Rows. There are a lot of combinations available like, 8×1, 8×2, 10×2, 16×1, etc. But the most used one is the 16*2 LCD, hence we are using it here. All the above mentioned LCD display will have 16 Pins and the programming approach is also the same and hence the choice is left to you. It comes with back lighting & works with almost any microcontroller. It works of 5v and has a green back light.

LCD DISPLAY:

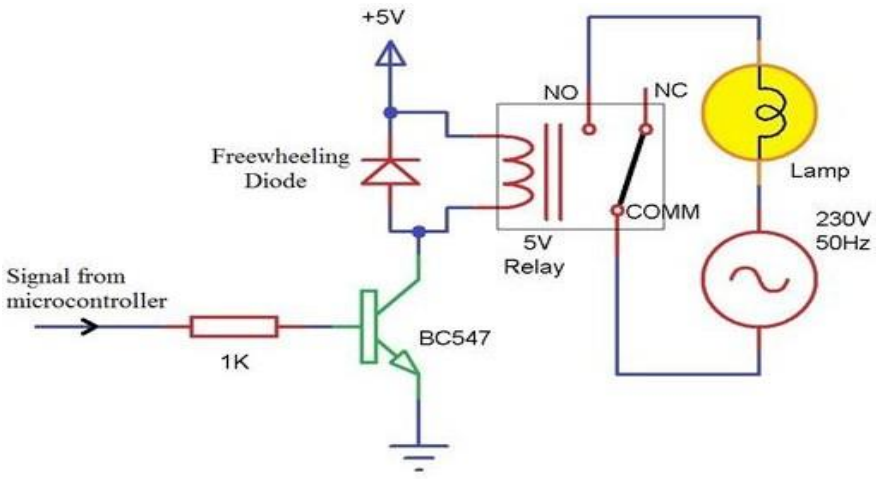
Specifications:



- Low power operation support: 2.7 to 5.5V
- LCD character display
- It has 2 lines of 16 characters each.
- 8 signal pins and 3 control pins
- 4-bit or 8-bit MPU interface enabled.
- Brightness can be adjusted externally

- Inbuilt memory

RELAY:



RELAY AND CIRCUITE DIGRAM

SYSTEM DESIGN:

4.1 Design & Interfacing

4.1.1 Interfacing of LEDs:

The 0.5mm LED needs a supply of 1.7V and 10mAmp maximum to glow at full intensity. The HIGH signal at the microcontroller output pin generated 5V and 200mAmp maximum current which is sufficient for LED. So it can be directly connected to the output pin of microcontroller. To protect the LED from higher supply current and voltage, a resistor in series is needed. Value of that current limiting resistor can be calculated with:

$$R= (V_{in}-V_{led})/I_{led}$$

Where: V_{in}= Input voltage to the LED

V_{led}= Maximum voltage required for LED

I_{led}= Maximum current required for LED

So, $R =(5V-1.7V)/ 10mA$

$=330$ Ohm

4.1.2 Interfacing of Buzzer

The digital buzzer needs a supply of 5V and 50mAmp maximum to generate sound at full intensity. The HIGH signal at the microcontroller output pin generated 5V and 200mAmp maximum current which is sufficient for buzzer. So it can be directly connected to the output pin of microcontroller.

5.1 Conclusion

We believe that this project will extremely helpful for industries to monitor and control the plant equipment and tools. In this project by considering all the situations and possibility, we decided the specification for project and chosen components which are helping to achieve the desire target. Though, design of circuit is critical due to non-availability of some of WiFi module in Protius software. Whereas due to the use of Arduino development tools, reduce difficulties during programming & troubleshooting was reduced. Though all the design is ready, hardware part will start in next phase of project.

5.2 Advantages

- Can be control & monitor from anywhere using webpage
- Use can also control machineries locally, using switches
- Any type of load can be controlled using relays
- Can easily replace the loads with another machines
- Provides 24x7 monitoring and control.
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5.3 Applications

- This system can be used with industrial as well as domestic loads.

5.4 Future scope of the project

Though in this system we are monitoring and gathering data about status of machines, there is some scope to work on it in future to make the system more perfect. Development of mobile application to get notification on alert.

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