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SMART ENERGY MONITORING SYSTEM USING IOT

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Abstract:

Smart application has become more and more popular in recent years. It aims at helping people manage the various devices freely and build an autonomous environment. This project introduces a wireless solution based on Internet protocol to manage the industrial units easily. Smart application system can connect the various units together and provide a unified interface for users to interact with the monitoring block. Some main features are listed such as motor control, load control, temperature control of motor, security and safety. Based this control the energy has consumed which can be monitored using IOT. As with the development of the Internet, Internet based remote monitoring and control solutions for industry has been proposed.

Key Words: Energy Consumption, Industial Monitoring, Load Control, Motor Control, Fire Sensor, Aurdino UNO, IOT & Temperature Sensor

1. Introduction:

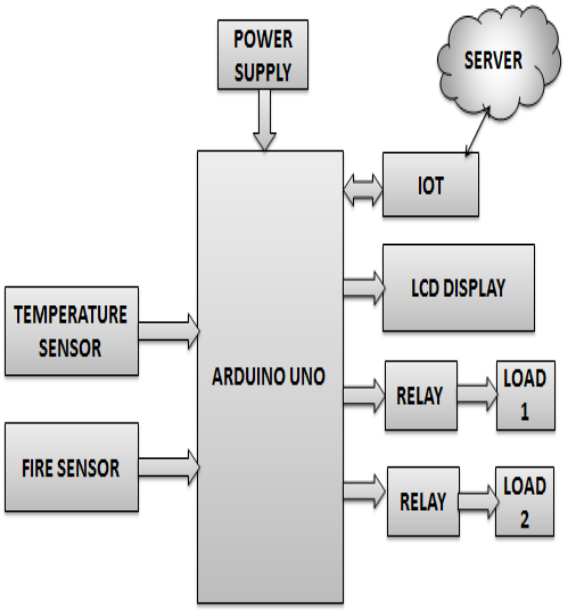
Electricity plays an important role in our life. Every moment of our life depends upon electricity. Electricity has several components and equipment helping human to transfer and regulate the distribution according to usage. The most crucial equipment of transmission and distribution of electric power is transformer. In power systems, an electrical equipment distribution transformer directly distributes power to the low-voltage users and its operation condition is an important criterion of the entire network operation. The majority of these devices have been in service for many years in different (electrical, mechanical and environmental) conditions.

Automation has much more importance in industry because due to automation overall productivity is increases. Quality of the product is also increases due to automation. It also reduces manufacturing cost. There are another several reasons such as lack of availability of skilled person, lack of industrial training centers so that automation got importance. Most of the developed countries suffer from lack of human resources. Those persons who work for their industry from many years they are leaving the industry. If they want to hire new candidate to replace old candidate then first problem is that new candidate is non-experienced. So we have to arrange training session. Candidate may leave the industry if workload is more. In case of developing country skill become important factor. They have more manpower but these peoples are not technically strong. Hence automation is become need.

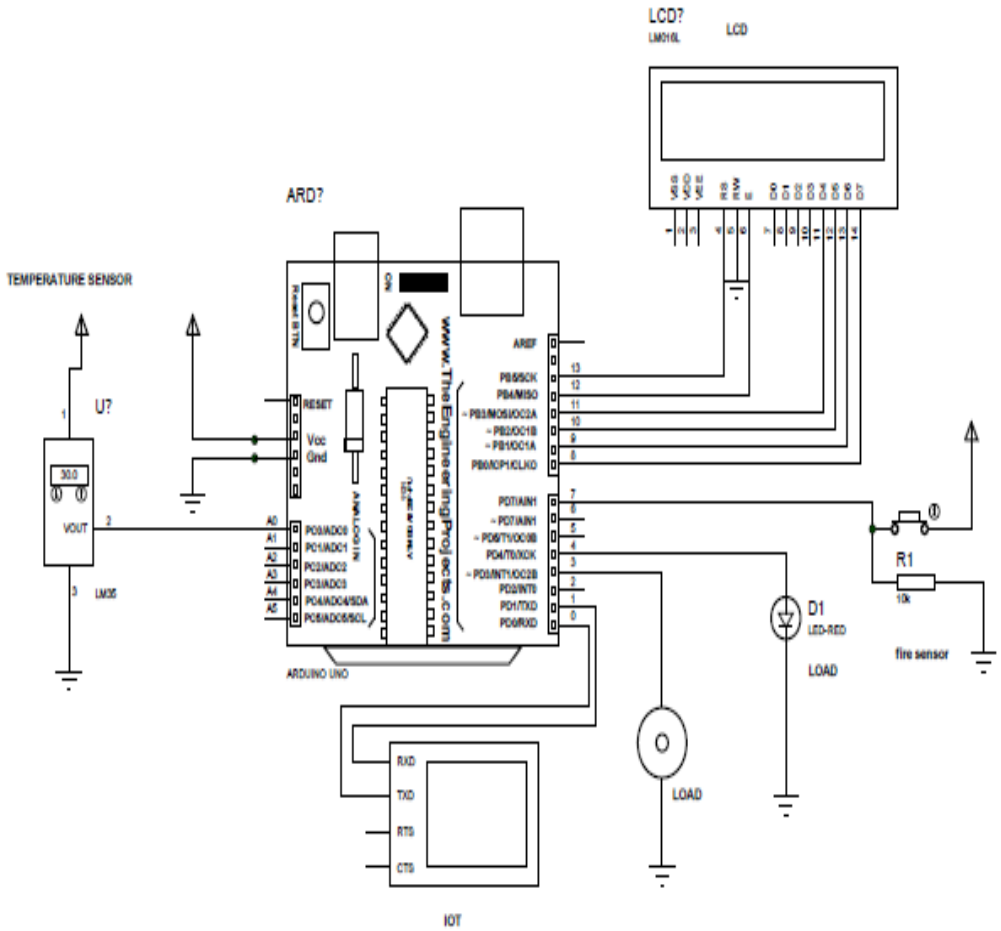
Technologies which are invented for the industrial automation deals with the monitoring and controlling of the various activities and different manufacturing process running in the industry. Machinery used in the industry has its own specification. In industry boilers are used for heating purpose. These boilers have own their operating temperature range. If the temperature of the boiler exceed beyond the threshold level then there is possibility of explosion of the boiler which become more dangerous. Hence controlling of temperature is important. All other parameters such as speed of the motor, torque of the motor, pressure, available light etc. must be monitor and control. In day today life people wants to have world in their fingerprints. That means use of internet is increased in great extent. Internet of things is a new emerging technology which connects all the living or nonliving things of the world using internet. Internet of things allows the communication between the people and thing anytime, anywhere using large internet network. To monitor and control such automation process we can use concept of internet of things. We can also control this parameter by providing appropriate feedback command. For this communication between devices and web page we use controlling device along with IOT.

2. Block Diagram:

This is our proposed system block diagram. Our smart energy monitoring system consists Aurdino uno, temperature and fire sensors, power supply, lcd, load, motor, IOT, server and relays.



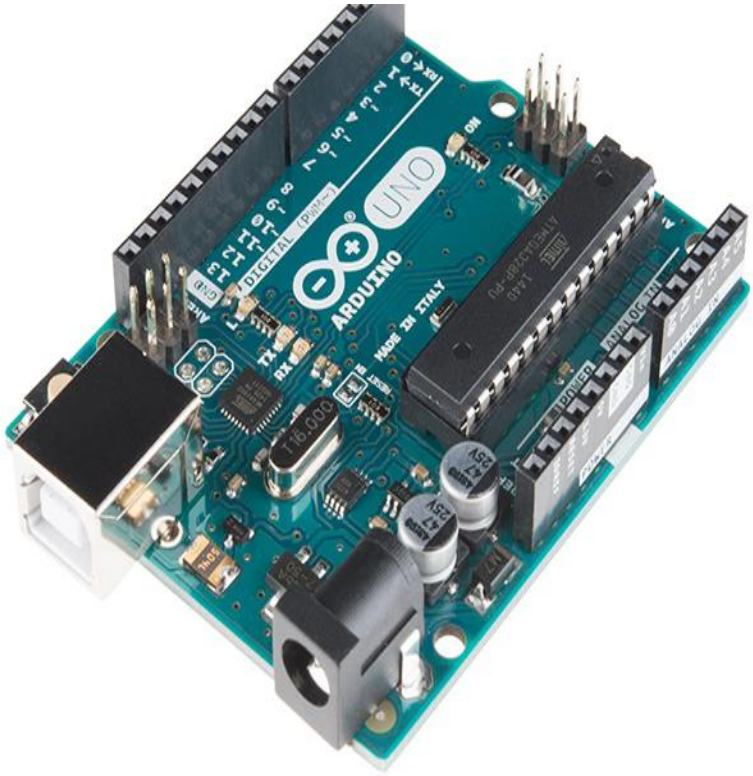
3. Circuit Diagram:



This is the circuit diagram of our proposed system.

4. Components:

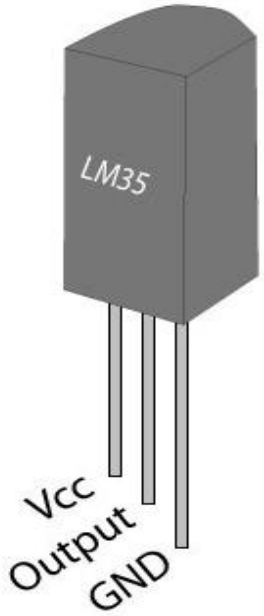
Arduino Uno the hardware system is based on the Arduino Uno is a type of microcontroller component that is used in the development of electronics, computers, robotics and similar devices. It is controlled by software and programmed in such a way that it performs different tasks and controls a generation line.



Each of the 14 digital pins and 6 analog pins on the uno can be used as an input or output, using pinmode(), digital write(), and digital read() functions. They operate at 5 volts. The uno has 6 analog inputs, each of which provide 10 bits of resolution (i.E. 1024 different values).

Temperature Sensor:

LM35 is a precision IC temperature sensor with its output proportional to the temperature (in ^{o}c). The sensor circuitry is sealed and therefore it is not subjected to oxidation and other processes. With lm35, temperature can be measured more accurately than with a thermistor. It also possess low self heating and does not cause more than 0.1 ^{o}c temperature rise in still air. It is suitable for remote purposes.



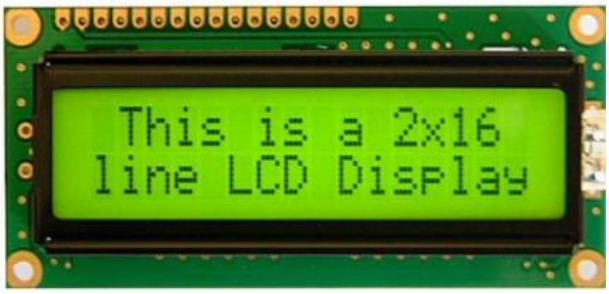
Fire Sensor:

IR based flame sensor is used. It is based on the YG1006 sensor which is a high speed and high sensitive NPN silicon phototransistor. It can detect infrared light with a wavelength ranging from 700nm to 1000nm and its detection angle is about 60°. Flame sensor module consists of a photodiode (IR receiver), resistor, capacitor, potentiometer, and LM393 comparator in an integrated circuit.

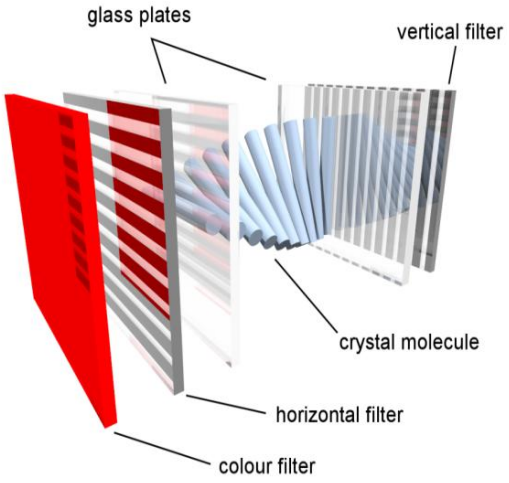
The sensitivity can be adjusted by varying the on board potentiometer. Working voltage is between 3.3v and 5v DC, with a digital output. Logic high on the output indicates presence of flame or fire. Logic low on output indicates absence of flame or fire.

LCD Display:

LCD (Liquid Crystal Display) screen is an electronic display module and find a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. These modules are preferred over seven segments and other multi segment LEDs. The reasons being: LCDs are economical; easily programmable; have no limitation of displaying special & even custom characters (unlike in seven segments), animations and so on. A 16x2 LCD means it can display 16 characters per line and there are 2 such lines.

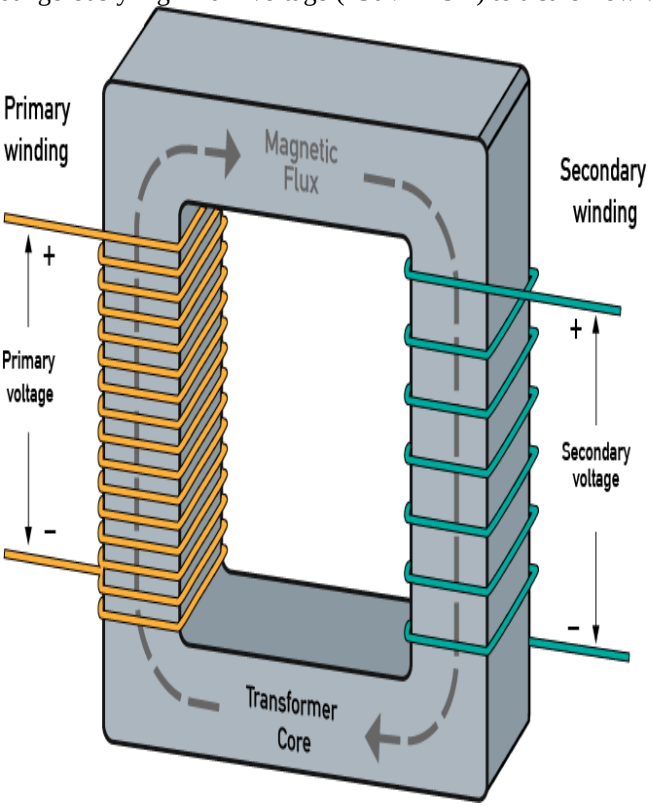


In this LCD each character is displayed in 5x7 pixel matrix. This LCD has two registers, namely, Command and Data. The command register stores the command instructions given to the LCD. A command is an instruction given to LCD to do a predefined task like initializing it, clearing its screen, setting the cursor position, controlling display etc. The data register stores the data to be displayed on the LCD.



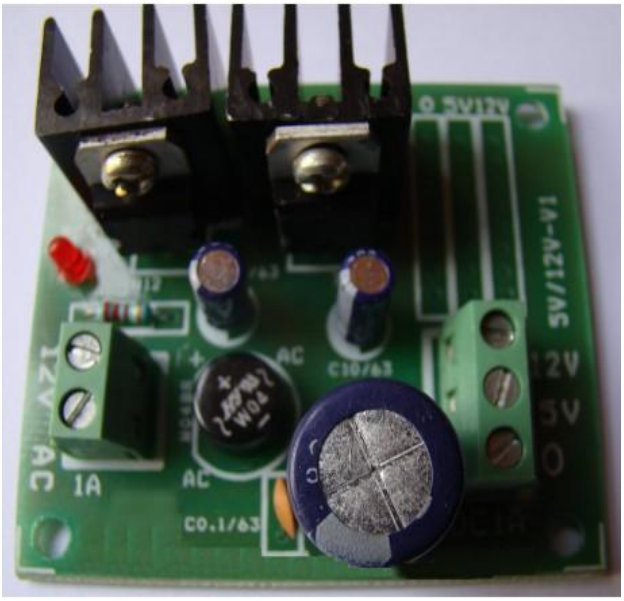
Transformer:

Transformers convert AC electricity from one voltage to another with little loss of power. Transformers work only with AC and this is one of the reasons why main electricity is AC. Step-up transformers increase voltage, step-down transformers reduce voltage. Most power supplies use a step-down transformer to reduce the dangerously high main voltage (230V in UK) to a safer low voltage.



Power Supply:

Power supply is reference to a source of electrical power. A device or system that supplies electrical or other types of energy to an output load or group of loads is called a power supply unit or PSU. This term is most commonly applied to electrical energy supplies, less often to mechanical ones, and rarely to others.



5. Operation:

Temperature sensor is used to monitor the heat condition of the industrial device. The measured detail uploads to IOT. Fire sensor is used for fire detection purpose which is connected to Arduino uno. Lcd display is

used to display the measured details. The industrial devices like motor and load are monitored using temperature sensor and machine speed is controlled using IOT. Then measured parameters will also updated to the IOT website.

6. Conclusion:

Thus we built a system for monitoring and controlling of industrial environment by using new emerging technology of internet of things. This system gives efficient solution than other systems. In this system we collect the data from the sensor and made it available to the user from remote location anytime. Hence it will become low cost, high efficient embedded system. The advantages of the developed system are to have a continuous monitoring over industrial applications and also control them if going beyond their threshold conditions. As sometimes it will be late in this process and it will harm to property as well as life. For this purpose we are developing a system for Industrial Automation using IoT with the help of Artificial Intelligence to make system automated which will take intelligent decisions.

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