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Industrial Automation using Arduino with-IOT

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Abstract: IOT or internet of things is a technology that makes use of control systems such as computer to control the physical devices over the internet. Here we propose efficient industry automation system that allows user to efficiently control industry appliances/machines over the internet. We use 3 loads as industrial appliances or machines and a motor to demonstrate as an industrial motor.

Keywords: Automation using IOT, Industry Automation using cloud, Cloud automation.

I. INTRODUCTION

This Project presents the development of a firmware for smart switch, which can control the on-off of any electrical device in Industry by using internet. The smart switch is connected to Industry by using internet access. In order to perform this connection it is necessary to write the IP pre-programmed into the smart switch in a web browser with the purpose to load the smart switch server, which will open a configuration page to write the data of the user's network. Then, the user will select in automatic mode the network, the security type, and the user must have written a passphrase. Once this information is uploaded and saved, it is necessary to restart the smart switch in order to get access to internet, from which the user can control the smart switch simply sending a number one or a number zero to switch the electrical device, this process is done without the use of internet, i.e. by using a local network. Project is based on IOT. The Internet of Things (IoT) is a system of interrelated computing devices, mechanical and digital machines, objects, animals or people that are provided with unique identifiers and the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction.

A thing in the Internet of Things, can be a person with a heart monitor implant, a farm animal with a biochip transponder, an automobile that has built-in sensors to alert the driver when tire pressure is low or any other natural or man-made object that can be assigned an IP address and provided with the ability to transfer data over a network.

II. BLOCK DIAGRAM

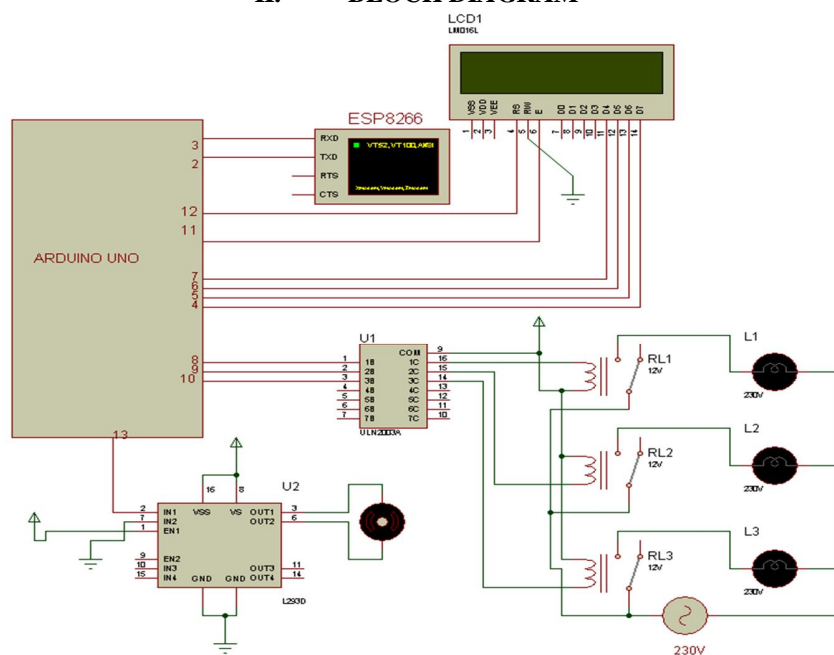


Fig 1:Block Diagram of Industrial automation.

III. WORKING OF INTERNET OF THINGS

An IoT system consists of sensors/devices which communicate to the cloud through some kind of connectivity¹. Once the data gets to the cloud, software processes it and then might decide to perform an action, such as sending an alert or automatically adjusting the sensors/devices without the need for the user. But if the user input is needed or if the user simply wants to check in on the system, a user interface allows them to do so. Any adjustments or actions that the user makes are then sent in the opposite direction through the system: from the user interface, to the cloud, and back to the sensors/devices to make some kind of change.

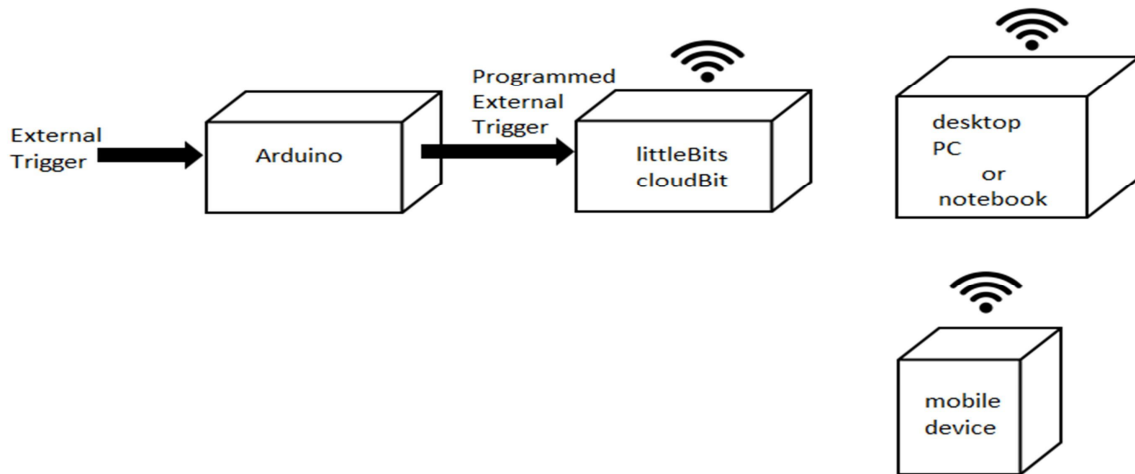


Fig 2. Internet of things basic block diagram

IV. WHAT IS INDUSTRY AUTOMATION

Industrial automation is the rapid growing technology in the world in the present days. Due to the rapid advances in technology, all industrial processing systems, factories, machinery, test facilities, etc. turned from mechanization to automation. A mechanization system needs human intervention to operate the manual operated machinery. As new and efficient control technologies evolved, computerized automation control is being driven by the need for high accuracy, quality, precision and performance of industrial processes. Automation is step beyond the mechanization which makes use of high control capability devices for an efficient manufacturing or production processes.

V. HARDWARE COMPONENTS

A. Arduino

The Arduino UNO is a microcontroller board based on ATmega328. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs. A 16MHz ceramic resonator, a USB connection, a power jack, an ICSP header and a reset button. It consists of everything needed to support connect it to a computer with a USB cable or power it with a AC to DC adapter or battery to get started.

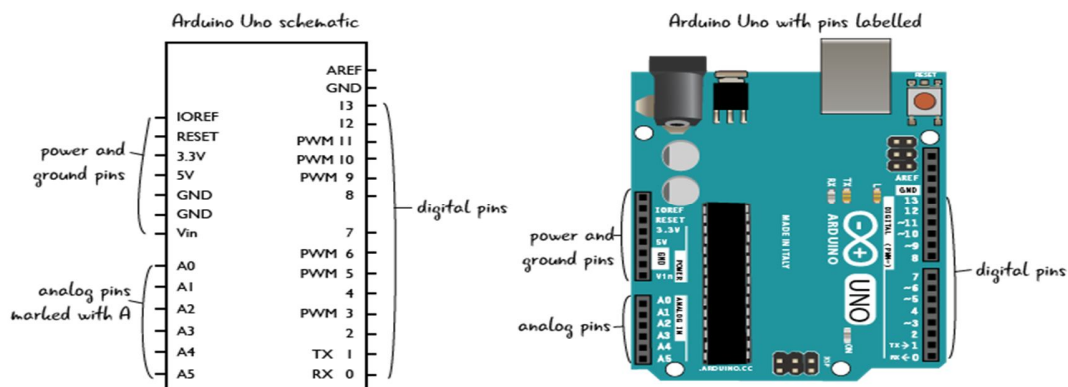


Fig 3: Arduino Block Diagram

B. Wifi-Module(ESP8266)

ESP8266EX offers a complete and self-contained WiFi networking solution; it can be used to host the application or to offload WiFi networking functions from another application processor. When ESP8266EX hosts the application, it boots up directly from an external flash. It has integrated cache to improve the performance of the system in such applications. Alternately, serving as a WiFi adapter, wireless internet access can be added to any micro controller-based design with simple connectivity. ESP8266EX is among the most integrated WiFi chip in the industry; it integrates the antenna switches, low noise receive amplifier, filters, power management modules, it requires minimal external circuitry, and the entire solution, including front-end module, is designed to occupy minimal PCB area.

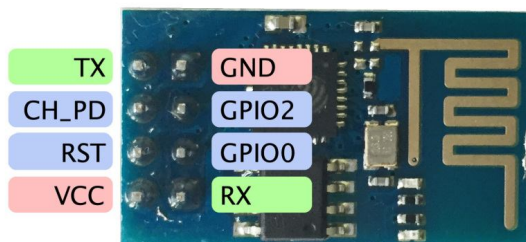


Fig 4:Wifi-Module(esp8266)

C. Relay

Relays are used everywhere for the automatic closing of the circuit. When no voltage is applied to pin 1, there is no current flow through the coil. No current means no magnetic field is developed, and the switch is open. When voltage is supplied to pin 1, current flows through the coil, creating the magnetic field needed to close the switch, allowing continuity between pins 2 and 4.



Fig 5: Relay

D. Relay Driver Circuit

A Relay driver IC is an electro-magnetic switch that will be used whenever we want to use a low voltage circuit to switch a light bulb ON and OFF which is connected to 220V mains supply. The required current to run the relay coil is more than can be supplied by various integrated circuits like Op-Amp, etc. Relays have unique properties and are replaced with solid state switches that are stronger than solid-state devices. High current capacities, capability to stand ESD and drive circuit isolation are the unique properties of Relays.



Fig 6:Relay Driver Circuit-ULN2003

E. 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 16*2 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.



Fig 7: Lcd Display

VI. CONCLUSION

IOT based industrial automation is a creation of technology and its applications in order to control and monitor the production and delivery of various goods and services. It performs the tasks that were previously performed by humans. The automation increases the productivity by using this we can operate the things through virtually by using the cloud servers. We can use this type of technology in many areas like defence, manufacturing and transportation etc., We can increase the output efficiency through this technology. Through this we can operate the things at anywhere over the internet at any place in the world through the cloud server.

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