A Mini Project Report

On

INDUSTRIAL MONITERING SYSTEM USING IOT

Submitted in partial fulfillment of the requirements for the award of the degree of

Bachelor of Technology

In

ELECTRONICS AND COMMUNICATION ENGINEERING

By

S PAVAN RAJ	**15H61A04A3**
RAMAKRISHNA	**16H65A0421**
SRIKANTH	**15H61A0481**
NARENDRAR KUMAR	**15H61A0495**

Under the guidance of

Mr. M. Murali Krishna

Assistant professor

Department of ECE

Department of Electrical and Electronics Engineering

ANURAG GROUP OF INSTITUTIONS

(Formerly CVSR College of Engineering)

An Autonomous Institution

Permanently Affiliated to Jawaharlal Nehru Technological University,

Hyderabad Venkatapur (v) Ghatkesar (M) Ranga Reddy District

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CERTIFICATE

This is to certify that the project entitled "INDUSTRIAL MONITORING SYSTEM USING IOT" is a bonafide work done in partial fulfillment for the award of degree of Bachelor of Technology in Electrical and Electronics Engineering of Jawaharlal Nehru Technological University done by following students during the academic year 2017-2018 under our guidance and supervision.

Internal guide	Head of the department
Mr.M. Murali Krishna	**Dr. SATHEESH KUMARAN**
Assistant Professor	Professor
ECE Department	ECE Department

External Examiner

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ABSTRACT

Industry is a group of productive enterprises or organizations that produce or supply goods, services, or sources of income.Primary industry -agriculture, forestry, fishing, mining, quarrying, and the extraction of minerals.Secondary industry-deals with the manufacturing, Involve the manufacture of raw materials.Tertiary Industry-deals with Services industry, Neither produce a raw material nor make a product.Quaternary Industries-Involve the use of high tech industries. People who work for these companies are often highly qualified within their field of work.The IoT is a network of intelligent computers, devices, and objects that collect and share huge amounts of data.The further generation industries will be definitely more advanced and automatic as compared with existing ones. This brings on a new terminology of "Smart Industries".

We propose an Smart monitoring system using sensors.This monitors the internal parameters of the industry.The internal parameters that we considered are Temperature, Smoke, Fire, Light and Motion Detection.In addition to this , it sends notifications to smartphone and e-mail when any of the parameter crosses the threshold level.The industry officials can have a constant monitoring of the system if any of the parameter changes.The sensors are connected to Node MCU which is powered using power supply source and connected to the server using common WIFI .The IOT platform which we are using is "BLYNK" , which is an open source application available on Android Play Store and AppStore.

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LIST OF ABBREVATIONS USED

ABBREVATION	**EXPANSION**
API	Application program interface
UI	User interface
GSM	Global system for mobile
IDE	Integrated Development Environment
USB	Universal Bus
GPS	Global Positioning System
IC	Integrated circuits
GPIO	General purpose input/output
ADC	Analog to Digital converter
IOT	Internet of Things
MCP	Multi Chip Package

CHAPTER 1

INTRODUCTION

1.1 PURPOSE OF IMPLEMENTATION

With the traditional methods, the industrial parameters are monitored through individual LCD displays. The parameters are measured manually by the worker.For monitoring the parameters in various locations, the individual worker has to be present and has to keep a check on the parameters . The parameters have to be monitored continuously. In case, the measured parameter value exceeds certain value at the instant of that monitoring, the control process will be handled by the worker and the parameter value is regulated.Assignig individual worker for parameter is very difficult and manpower required is also very high.If any any misinterpretation occurs than that may lead a huge loss to the industry. In this era of technology, where innovations are made every day to replace or reduce human work.We propose an Smart monitoring system using sensors.This monitors the internal parameters of the industry.

1.2 EMBEDDED SYSTEMS

An embedded system is combination of computer hardware and software, either fixed incapability or programmable, that is designed for a specific function or for specific functions within a larger system. Industrial machines, agricultural and process industry devices, automobiles, medical equipment, cameras, household appliances, airplanes, vending machines and toys as well as mobile devices are all possible locations for an embedded system. These are computing systems, but can range from having no user interface (UI) for example, on devices in which the embedded system is designed to perform a single task to complex graphical user interfaces (GUI), such as in mobile devices. User interfaces can include buttons, LEDs, touchscreen sensing and more. Some systems use remote user interfaces as well.Embedded systems can be microprocessor or microcontroller based. In either case, there is an integrated circuit (IC) at the heart of the product that is generally designed to carry out computation for real-time operations. Microprocessors are visually indistinguishable from microcontrollers, but whereas the microprocessor only implements a central processing unit (CPU) and thus requires the addition of other components such as memory chips, microcontrollers are designed as self-contained systems.

Microcontrollers include not only a CPU, but also memory and peripherals such as flash memory, RAM or serial communication ports.Because microcontrollers tend to implement full (if relatively low computer power) systems, they are frequently put to use on more complex tasks.

1.3 EMBEDDED SYSTEMS IN INDUSTRY

The embedded systems are used in various industrial applications such as process control, sensors, actuators, robotics etc. The adoption of embedded systems in industrial applications provide power efficiency with high performance and robust environmental design which resist water, moisture, dust and extreme temperature conditions. The other major advantage of industrial embedded systems is it supports cost effective and advanced Human Machine Interface (HMI), supports high speed wired and wireless communication and features for safety implementation. The conventional micro-controllers and micro-processors in industrial applications are now replaced by system on chip (SoC) and system on module (SoM) embedded platforms.

The rising focus of manufacturers to improve the energy efficiency has resulted in adoption of embedded system supported devices, which is the major driver for the growth of industrial embedded systems market. The increase in adoption of smart embedded system with complex functionalities such as imaging, smart sensors, wireless connectivity etc. to enhance the production efficiency is expected to drive the growth of global industrial embedded systems market. The technological advancements in embedded systems increased reliability, less operational cost, reduced power consumption, enhanced applications etc. is expected to propel the growth of global industrial embedded systems market. The rising adoption of Industrial Internet of Things (IIoT) solutions in developed economies is expected to boost the global industrial embedded systems growth. Japan accounts for significant share in industrial embedded systems market due to well-established embedded systems industry in the country.

Application domains have had a considerable impact on the evolution of embedded systems in terms of required methodologies and supporting tools, and resulting technologies. A good example is the accelerated evolution of the SoC design to meet demands for computing power posed by DSP, and network and multimedia processors. SoC based designs are slowly making inroads in to the area of industrial automation to implement complex field-area intelligent devices which integrate intelligent sensor/actuator functionality by providing on-chip signal conversion, data and signal processing, and communication functions. There is a growing tendency to network field-area intelligent devices around industrial communication networks, or fieldbuses.The global industrial embedded systems market can be divided into seven regions, Western Europe, Eastern Europe, Asia Pacific Excluding Japan (APEJ), Japan and Middle East and Africa (MEA). Western Europe accounts for major share in global industrial embedded systems market. This is attributed to the well-established manufacturing industries in the region. The rising adoption of embedded system assisted automation system is expected to drive the growth of industrial embedded systems market in the region. North America holds significant share in global industrial embedded systems market. The digital transformation of industries and adoption of Industrial Internet of Things (IIoT) solutions is expected to drive the

growth of industrial embedded systems market in the region. APEJ is expected to generate significant revenue in industrial embedded systems market during the forecast, owing the rising industrialisation in the region.

1.4 INTERNET OF THINGS

Internet of Things (IoT) is an ecosystem of connected physical objects that are accessible through the internet. The 'thing' in IoT could be a person with a heart monitor or an automobile with built-in-sensors, i.e. objects that have been assigned an IP address and have the ability to collect and transfer data over a network without manual assistance or intervention. The embedded technology in the objects helps them to interact with internal states or the external environment, which in turn affects the decisions taken.

The IoT is a giant network of connected things and people all of which collect and share data about the way they are used and about the environment around them.That includes an extraordinary number of objects of all shapes and sizes – from smart microwaves, which automatically cook your food for the right length of time, to self-driving cars, whose complex sensors detect objects in their path, to wearable fitness devices that measure your heart rate and the number of steps you've taken that day, then use that information to suggest exercise plans tailored to you. There are even connected footballs that can track how far and fast they are thrown and record those statistics via an app for future training purposes.Devices and objects with built in sensors are connected to an Internet of Things platform, which integrates data from the different devices and applies analytics to share the most valuable information with applications built to address specific needs.

These powerful IoT platforms can pinpoint exactly what information is useful and what can safely be ignored. This information can be used to detect patterns, make recommendations, and detect possible problems before they occur.IoT is short for Internet of Things. The Internet of Things refers to the ever-growing network of physical objects that feature an IP address for internet connectivity, and the communication that occurs between these objects and other Internet-enabled devices and systems.

The Internet of Things extends internet connectivity beyond traditional devices like desktop and laptop computers, smartphones and tablets to a diverse range of devices and everyday things that utilize embedded technology to communicate and interact with the external environment, all via the Internet.

1.5 APPLICATIONS OF IOT

1) Smart home

Smart Home clearly stands out, ranking as highest Internet of Things application on all measured channels. More than 60,000 people currently search for the term “Smart Home” each month. This is not a surprise. The IoT Analytics company database for Smart Home includes 256 companies and startups.

2. Wearables

Wearables remains a hot topic too. As consumers await the release of Apple’s new smart watch in April 2015, there are plenty of other wearable innovations to be excited about: like the Sony Smart B Trainer, the Myo gesture control, or LookSee bracelet. Of all the IoT startups, wearables maker Jawbone is probably the one with the biggest funding to date.

3. Smart City

Smart city spans a wide variety of use cases, from traffic management to water distribution, to waste management, urban security and environmental monitoring. Its popularity is fueled by the fact that many Smart City solutions promise to alleviate real pains of people living in cities these days. IoT solutions in the area of Smart City solve traffic congestion problems, reduce noise and pollution and help make cities safer.

4. Smart grids

Smart grids is a special one. A future smart grid promises to use information about the behaviors of electricity suppliers and consumers in an automated fashion to improve the efficiency, reliability, and economics of electricity. 41,000 monthly Google searches highlights the concept’s popularity.

5. Industrial internet

The industrial internet is also one of the special Internet of Things applications. While many market researches such as Gartner or Cisco see the industrial internet as the IoT concept with the highest overall potential, its popularity currently doesn’t reach the masses like smart home or wearables do.

CHAPTER 2

SOFTWARE REQUIRED

2.1 AURDINO

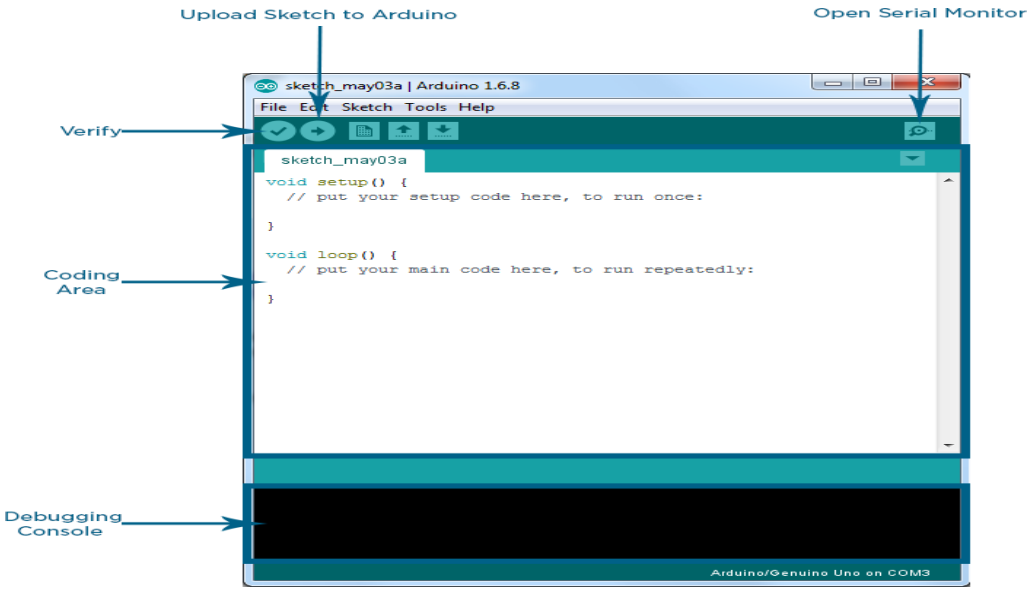
Arduino is an open source computer hardware and software company, project, and user community that designs and manufactures single-board microcontrollers and microcontroller kits for building digital devices and interactive objects that can sense and control objects in the physical and digital world. The project's products are distributed as open-source hardware and software, which are licensed under the GNU Lesser General Public License (LGPL) or the GNU General Public License (GPL), permitting the manufacture of Arduino boards and software distribution by anyone. Arduino boards are available commercially in preassembled form, or as do-it-yourself (DIY) kits.Arduino was born at the Ivrea Interaction Design Institute as an easy tool for fast prototyping, aimed at students without a background in electronics and programming. As soon as it reached a wider community, the Arduino board started changing to adapt to new needs and challenges, differentiating its offer from simple 8-bit boards to products for IoT applications, wearable, 3D printing, and embedded environments. All Arduino boards are completely open-source, empowering users to build them independently and eventually adapt them to their particular needs. The software, too, is open-source, and it is growing through the contributions of users worldwide.

Arduino is an open-source platform used for building electronics projects. Arduino consists of both a physical programmable circuit board (often referred to as a microcontroller) and a piece of software, or IDE (Integrated Development Environment) that runs on your computer, used to write and upload computer code to the physical board.

The Arduino platform has become quite popular with people just starting out with electronics, and for good reason. Unlike most previous programmable circuit boards, the Arduino does not need a separate piece of hardware (called a programmer) in order to load new code onto the board – you can simply use a USB cable. Additionally, the Arduino IDE uses a simplified version of C++, making it easier to learn to program. Finally, Arduino provides a standard form factor that breaks out the functions of the micro-controller into a more accessible package.

Arduino has been used in thousands of different projects and applications. The Arduino software is easy-to-use for beginners, yet flexible enough for advanced users. It runs on Mac, Windows, and Linux. Teachers and students use it to build low cost scientific instruments, to prove chemistry and physics principles, or to get started with programming and robotics. Designers and architects build interactive prototypes, musicians and artists use it for installations and to experiment with new musical instruments.

There are many other microcontrollers and microcontroller platforms available for physical computing. Parallax Basic Stamp, Netmedia's BX-24, Phidgets, MIT's Handyboard, and many others offer similar functionality. All of these tools take the messy details of microcontroller programming and wrap it up in an easy-to-use package. Arduino also simplifies the process of working with microcontrollers, but it offers some advantage for teachers, students, and interested amateurs over other system.



2.2 BLYNK

Blynk is a Platform with iOS and Android apps to control Arduino, Raspberry Pi and the likes over the Internet.It's a digital dashboard where you can build a graphic interface for your project by simply dragging and dropping widgets.Blynk is not tied to some specific board or shield. Instead, it's supporting hardware of your choice. Whether your Arduino or Raspberry Pi is linked to the Internet over Wi-Fi, Ethernet or this new ESP8266 chip, Blynk will get you online and ready for the Internet Of Your Things**.** Monitor local weather conditions, control LEDs from your phone, even send a tweet when it's time to water your plants! Blynk is an easy-to-use app builder that allows users to add buttons, sliders, graphs, and RGB controllers to their phone. The SparkFun Blynk Board is specially designed to work with the 'widgets' within the Blynk mobile app to create IoT projects. Every Blynk Board comes fully programmed and also includes a Blynk subscription code card (15k Energy at a $10 value). You'll be controlling the Blynk Board from half way around the world in no time.Blynk is called "the most user-friendly IoT platform" for a reason. Blynk supports **400+** hardware platforms and major connectivity types.From prototyping platforms like Arduino and Raspberry Pi to industrial grade ESP8266, Intel, Sierra Wireless, Particle, Texas Instruments, and others.Secure, scalable, lightweight and fast. Ready to manage billions of requests from your edge devices. Deployable in minutes, Blynk Cloud is open-source. It can run in your environment, locally or on a dedicated Blynk Business Server.

Blynk was designed for the Internet of Things. It can control hardware remotely, it can display sensor data, it can store data, vizualize it and do many other cool things.

There are three major components in the platform:

- Blynk App - allows to you create amazing interfaces for your projects using various widgets we provide.

• Blynk Server - responsible for all the communications between the smartphone and hardware. You can use our Blynk Cloud or run your private Blynk server locally. It's open-source, could easily handle thousands of devices and can even be launched on a Raspberry Pi.

• Blynk Libraries - for all the popular hardware platforms - enable communication with the server and process all the incoming and outcoming commands.

Features of using BLYNK are

- Log and export data
- Change ui on the go
- HTTP REST API
- IFTTT integration
- SYNC STATES
- Similar API & UI for all supported hardware & devices
- Connection to the cloud using-WiFi,Bluetooth,BLE,Ethernet,USB (Serial),GSM
- Set of easy-to-use Widgets
- Direct pin manipulation with no code writing
- Easy to integrate and add new functionality using virtual pins
- History data monitoring via History Graph widget
- Device-to-Device communication using Bridge Widget
- Sending emails, tweets, push notifications, etc.

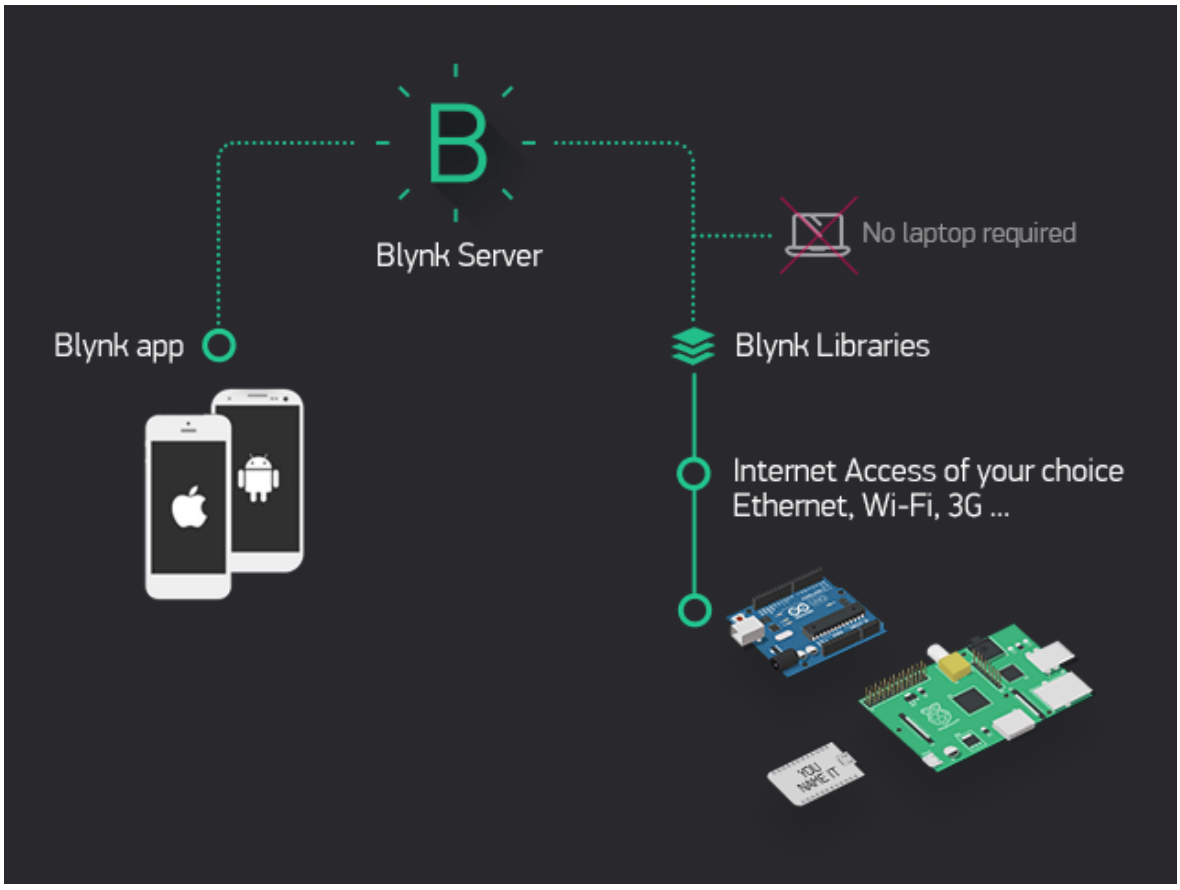
Setup Process:

1) Download Blynk App for Android or iOS
2) Get the Auth Token.In order to connect Blynk App and your hardware, you need an Auth Token.
3) Create a new account in Blynk App.
4) Create a New Project. Then choose the board and connection you will use.
5) After the project was created, we will send you Auth Token over email.
6) Check your email inbox and find the Auth Token.
7) Install Blynk Library
8) Download the latest release .zip file.
9) Unzip it. You will notice that archive contains several folders and several libraries.
10) Copy all these libraries to your_sketchbook_folder of Arduino IDE. To find the location of your_sketchbook_folder, go to top menu in Arduino IDE: File -> Preferences (if you are using Mac OS - go to Arduino → Preferences)Note that *libraries* should go to *libraries* and *tools* to tools. If you don't have tools folder you can create it by yourself.
11) Create your first example sketch code
12) Blynk works with hundreds of hardware models and connection types. We prepared Blynk Examples Sketch Builder that allows you to create example code for your hardware.
13) Choose Your board (for example: Arduino UNO)

14) Choose your connection (WiFi, Ethernet, Bluetooth, USB...)
15) Paste the Auth Token
16) In the example sketch, find this line:char auth[] = "YourAuthToken";
17) Change it with your Auth Token (it should be in your email inbox after you created the Project in the Blynk app. Now it should exactly like this (☝ don't forget the " "):char auth[] = "53e4da8793764b6197fc44a673ce4e21";
18) Flash the code to your hardware
19) Open serial monitor in Arduino IDE. You should see something like this

```
    ___  __          __
   / _ )/ /_ _____  / /__
  / _  / / // / _ \/  '_/
 /____/_/\_, /_//_/_/\_\
        /___/    v0.4.4

  [1240] Connecting to YourWiFi
  [1240] Connected to YourWiFi
  [1240] My IP: 192.168.10.172
  [1240] Blynk v0.4.4
  [5001] Connecting to blynk-cloud.com:80
  [5329] Ready (ping: 1ms)
```



CHAPTER 3

COMPONENTS REQUIRED

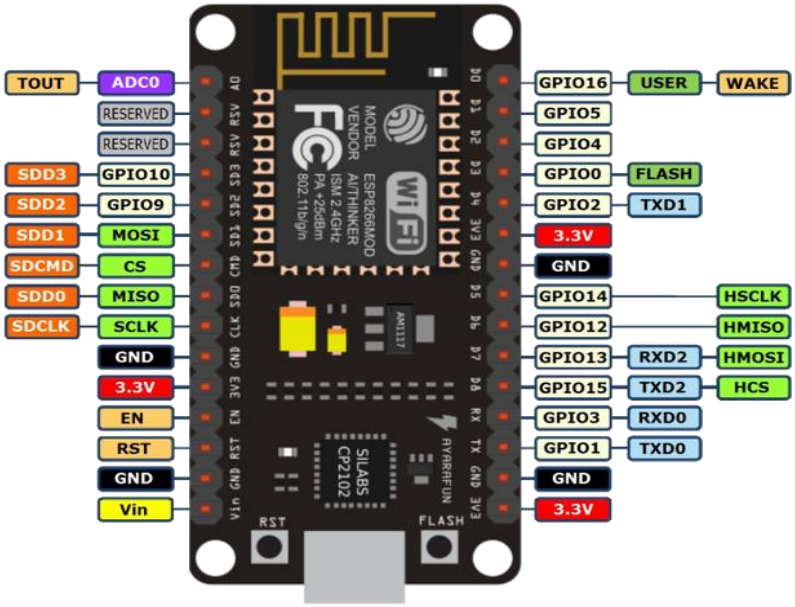
3.1 NODEMCU

NodeMCU is an open source LUA based firmware developed for ESP8266 wifi chip. By exploring functionality with ESP8266 chip, NodeMCU firmware comes with ESP8266 Development board/kit i.e. NodeMCU Development board.It is an open source IoT platform. It includes firmware which runs on the ESP8266 Wi-Fi SoC from Espressif Systems, and hardware which is based on the ESP-12 module. The term "NodeMCU" by default refers to the firmware rather than the development kits. The firmware uses the Lua scripting language. It is based on the eLua project, and built on the Espressif Non-OS SDK for ESP8266. It uses many open source projects, such as lua-cjson, and spiffs.

NodeMCU was created shortly after the ESP8266 came out. On December 30, 2013, Espressif Systems began production of the ESP8266.[10] The ESP8266 is a Wi-Fi SoC integrated with a Tensilica Xtensa LX106 core, widely used in IoT applications (see related projects). NodeMCU started on 13 Oct 2014, when Hong committed the first file of nodemcu-firmware to GitHub. Two months later, the project expanded to include an open-hardware platform when developer Huang R committed the gerber file of an ESP8266 board, named devkit v0.9. Later that month, Tuan PM ported MQTT client library from Contiki to the ESP8266 SoC platform, and committed to NodeMCU project, then NodeMCU was able to support the MQTT IoT protocol, using Lua to access the MQTT broker. Another important update was made on 30 Jan 2015, when Devsaurus ported the u8glib to NodeMCU project, enabling NodeMCU to easily drive LCD, Screen, OLED, even VGA displays. In summer 2015 the creators abandoned the firmware project and a group of independent but dedicated contributors took over. By summer 2016 the NodeMCU included more than 40 different modules. Due to resource constraints users need to select the modules relevant for their project and build a firmware tailored to their needs.

As Arduino.cc began developing new MCU boards based on non-AVR processors like the ARM/SAM MCU and used in the Arduino Due, they needed to modify the Arduino IDE so that it would be relatively easy to change the IDE to support alternate tool chains to allow Arduino C/C++ to be compiled down to these new processors. They did this with the introduction of the Board Manager and the SAM Core. A "core" is the collection of software components required by the Board Manager and the Arduino IDE to compile an Arduino C/C++ source file down to the target MCU's machine language. Some creative ESP8266 enthusiasts have developed an Arduino core for the ESP8266 WiFi SoC that is available at the GitHub ESP8266 Core webpage. This is what is popularly called the "ESP8266 Core for the Arduino IDE" and it has become one of the leading software development platforms for the various ESP8266 based modules and development boards, including NodeMCUs.

Developer	ESP8266 Opensource Community
Type	Single-board microcontroller
Operating system	XTOS
CPU	ESP8266 (LX106[2])
Memory	128kBytes
Storage	4MBytes
Power	USB



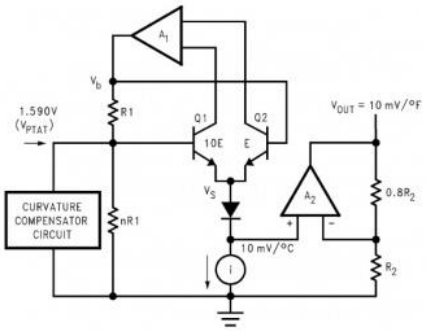
Pin Names on NodeMCU Development Kit	ESP8266 Internal GPIO Pin number
D0	GPIO16
D1	GPIO5
D2	GPIO4
D3	GPIO0
D4	GPIO2
D5	GPIO14
D6	GPIO12
D7	GPIO13
D8	GPIO15
D9/RX	GPIO3
D10/TX	GPIO1
D11/SD2	GPIO9
D12/SD3	GPIO10

3.2 TEMPERATURE SENSOR

In general,a temperature sensor is a device which is designed specifically to measure the hotness or coldness of an object.LM35 is a precision IC temperature sensor with its output proportional to the temperature (in °C).With LM35,the temperature can be measured more accurately than with a thermistor. It also possess low self heating and does not cause more than 0.1 °C temperature rise in still air. The operating temperature range is from -55°C to 150°C.The LM35's low output impedance,linear output, and precise inherent calibration make interfacing to readout or control circuitry especially easy.It has find its applications on power

supplies,battery management,appliances,etc.The LM35 is an integrated circuit sensor that can be used to measure temperature with an electrical output proportional to the temperature (in °C).It can measure temperature more accurately than a using a thermistor. The sensor circuitry is sealed and not subject to oxidation.The LM35 generates a higher output voltage than thermocouples and may not require that the output voltage be amplified.The LM35 has an output voltage that is proportional to the Celsius temperature.The scale factor is .01V/°C.

The LM35 does not require any external calibration or trimming and maintains an accuracy of +/-0.4°C at room temperature and +/-0.8°C over a range of 0°C to +100°C.Another important characteristic of the LM35 is that it draws only 60 micro amps from its supply and possesses a low self-heating capability.The LM35 comes in many different packages such as TO-92 plastic transistor-like package,T0-46 metal can transistor-like package,8-lead surface mount SO-8 small outline package.

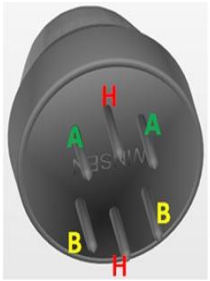


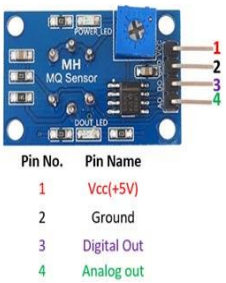
Supply voltage; 5V (+35V to -2V)	Vcc(+5V)
Output voltage (+6V to -1V)	Output
Ground (0V)	Ground

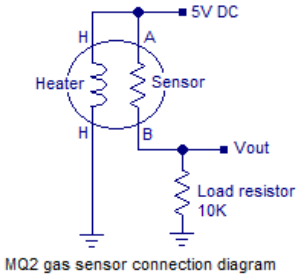
3.3 SMOKE SENSOR

Arduino MQ-2 gas sensor module are used in gas leakage detecting equipments in family and industry, are suitable for detecting of LPG, i-butane, propane, methane ,alcohol, Hydrogen, smoke. The MQ-2 is a flammable gas and smoke sensor detects the concentrations of combustible gas in the air and outputs its reading as an analog voltage.The sensor can measure concentrations of flammable gas of 300 to 10,000 ppm.The MQ-2 gas sensor is sensitive to LPG, i-butane, propane, methane, alcohol, Hydrogen and smoke.They are used in gas leakage detecting equipments in family and industry and in portable gas detector.Specifications of this sensors are

Detection range: 300 to 10000ppmm
The characteristics gas: 1000ppmm, isobutane
Sensitivity: R in air / Rin, typical gas ≥ 5
Sensing Resistance: 1KΩ 50ppm toluene to 20KΩ in.
Response time: ≤ 10s
Recovery time: ≤ 30s
Heat resistance: 31Ω ± 3Ω
Heating current: ≤ 180mA
Heating voltage: 5.0V ± 0.2V
Heating power: ≤ 900mW
Measuring voltage: ≤ 24V
Working conditions of ambient temperature: -20 ℃ ~ +55 ℃
Humidity: ≤ 95% RH
Environmental oxygen content: 21%
Storage conditions Temperature: -20 ° C to +70 ° C
Humidity: ≤ 70% RH







MQ2 gas sensor connection diagram

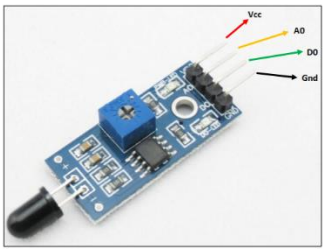
Vcc	This pin powers the module, typically the operating voltage is +5V
Ground	Used to connect the module to system ground
Digital Out	You can also use this sensor to get digital output from this pin, by setting a threshold value using the potentiometer
Analog Out	This pin outputs 0-5V analog voltage based on the intensity of the gas

H -Pins	Out of the two H pins, one pin is connected to supply and the other to ground
A-Pins	The A pins and B pins are interchangeable. These pins will be tied to the Supply voltage.
B-Pins	The A pins and B pins are interchangeable. One pin will act as output while the other will be pulled to ground.

3.4 FLAME SENSOR

The flame sensor is used to detect the fire or other light sources which are in the range of wavelength from 760nm to 1100nm. The module consists of an IR sensor, potentiometer, OP-Amp circuitry and a led indicator. When a flame will be detected, the module will turn on its red led. This module is sensitive to flame but it can also detect ordinary light. The detection point is 60 degrees. The sensitivity of this sensor is adjustable and it also has a stable performance.

t has both outputs, analog and digital. The analog output gives us a real time voltage output signal on thermal resistance while the digital output allows us to set a threshold via a potentiometerThe operating voltage is from 3.3 – 5V.It gives us both analog and digital output.It has a led indicator, which indicates that whether the flame is detected or not.The threshold value can be changes by rotating the top of potentiometer.Flame detection distance, lighter flame test can be triggered within 0.8m, if the intensity of flame is high, the detection distance will be increased.The detection angle of the flame sensor module is about 60 degrees.



A0: This is the analog pin and this will be connected to the analog pin of the Arduino.

Gnd: This is the ground pin and this will be connected to the ground of the Arduino.

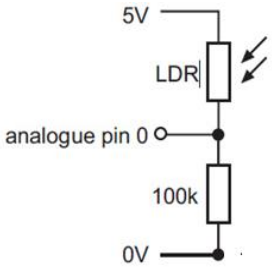
Vcc: This is the input voltage pin of the sensor and this will be connected to the +5V of Arduino.

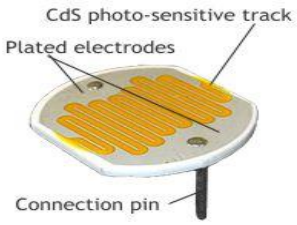
D0: This is the digital pin and this will be connected to the digital pin of Arduino.

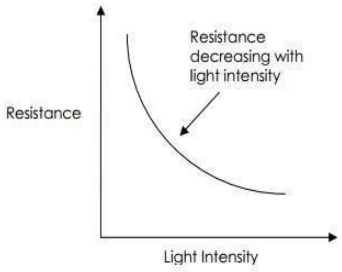
3.5 LIGHT SENSOR

Photo resistors, also known as light dependent resistors (LDR), are light sensitive devices most often used to indicate the presence or absence of light, or to measure the light intensity. In the dark, their resistance is very high, sometimes up to 1MΩ, but when the LDR sensor is exposed to light, the resistance drops dramatically, even down to a few ohms, depending on the light intensity. LDRs have a sensitivity that varies with the wavelength of the light applied and are nonlinear devices. They are used in many applications but are sometimes made obsolete by other devices such as photodiodes and phototransistors. Some countries have banned LDRs made of lead or cadmium over environmental safety concerns.
Based on the materials used, photo resistors can be divided into two types; intrinsic and extrinsic. Intrinsic photo resistors use undoped materials such as silicon or germanium. Photons that fall on the device excite electrons from the valence band to the conduction band, and the result of this process are more free electrons in the material, which can carry current, and therefore less resistance. Extrinsic photo resistors are made of materials doped with impurities, also called dopants. The dopants create a new energy band above the existing valence band, populated by electrons. These electrons need less energy to make the transition to the conduction band thanks to the smaller energy gap. The result is a device sensitive to different wavelengths of light. Regardless, both types will exhibit a decrease in resistance when illuminated. The higher the light intensity, the larger the resistance drop is. Therefore, the resistance of LDRs is an inverse, nonlinear function of light intensity.
The sensitivity of a photo resistor varies with the light wavelength. If the wavelength is outside a certain range, it will not affect the resistance of the device at all. It can be said that the LDR is not sensitive in that light wavelength range. Different materials have different unique spectral response curves of wavelength versus sensitivity. Extrinsic light dependent resistors are generally designed for longer wavelengths of light, with a tendency towards the infrared (IR). When working in the IR range, care must be taken to avoid heat buildup, which could affect measurements by changing the resistance of the device due to thermal effects.
The figure shown here represents the spectral response of photoconductive detectors made of different materials, with the operating temperature expressed in K and written in the parentheses.
The most common type of LDR has a resistance that falls with an increase in the light intensity falling upon the device (as shown in the image above).

The resistance of an LDR have the resistances:Daylight=5000Ω;Dark=20000000Ω





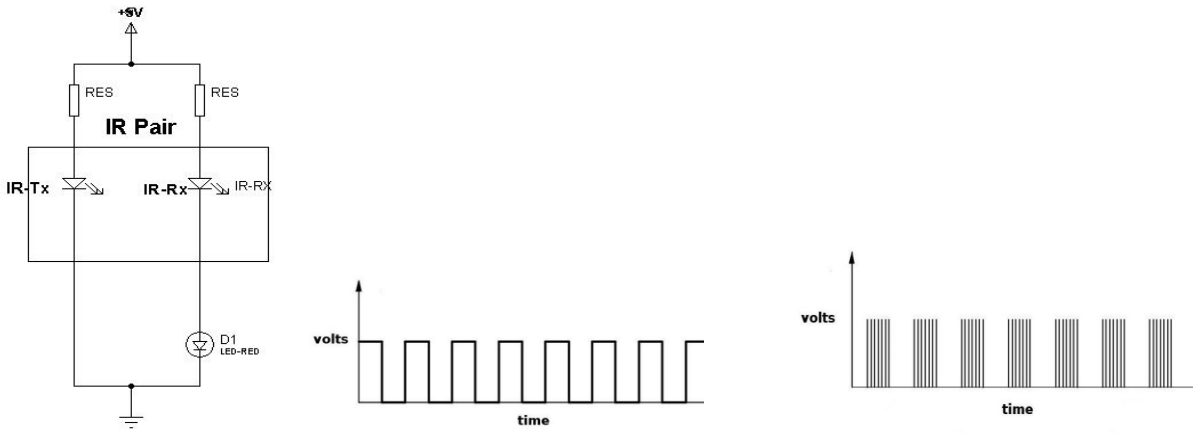


3.6 IR SENSOR

IR pair is an electronic device which consists of two parts i) Transmitter and ii) Receiver. Transmitter is used to transmits or emit the INFRARED rays and the receiver is used simply to receive these radiations. The IR transmitter consists of the LED that emits the IR(Infra Red) radiation. A remote control patterns a flash of invisible light which is turned into an instruction and is received by the receiver module.IR Transmitter and receiver are used to control any device wirelessly, means remotely. TV remote and TV are the best example of IR transmitter and receiver. TV generally consist TSOP1738 as the IR receiver, which senses modulated IR pulses and convert them into electrical signal. The IR signal is modulated during transmission. Modulation means assigning pattern to the data to be sent to the receiver.The most commonly used IR modulation is about 38khz. R LED emits infrared light, means it emits light in the range of Infrared frequency. We cannot see Infrared light through our eyes, they are invisible to human eyes. The wavelength of Infrared (700nm – 1mm) is just beyond the normal visible light. Everything which produce heat, emits infrared like our human body. Infrared have the same properties as visible light, like it can be focused, reflected and polarised like visible light.

Other than emitting invisible infrared light, IR LED looks like a normal LED and also operates like a normal LED, means it consumes 20mA current and 3vots power. IR LEDs have light emitting angle of approx. 20-60 degree and range of approx. few centimetres to several feets, it depends upon the type of IR transmitter and the manufacturer. Some transmitters have the range in kilometres.

Transmitter is often known as IR LED and the Receiver as IR Sensor.



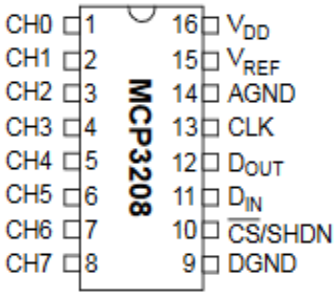
When you hit a key on your remote, the transmitting IR LED will blink very quickly for a fraction of a second, transmitting encoded data to your appliance.

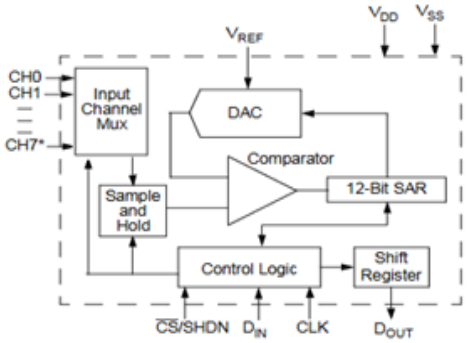
3.7 ADC

The Microchip Technology Inc. MCP3204/3208 device is a successive approximation 12-bit Analog-to-Digital (A/D) Converter with on-board sample and hold circuitry. The MCP3204 is programmable to pro-vide two pseudo-differential input pairs or four single-ended inputs. The MCP3208 is programmable to pro-vide four pseudo-differential input pairs or eight single-ended inputs. Differential Nonlinearity (DNL) is specified at ±1 LSB, while Integral Nonlinearity (INL) is offered in ±1 LSB (MCP3204/3208-B) and ±2 LSB (MCP3204/3208-C) versions.Communication with the devices is accomplished using a simple serial interface compatible with the SPI protocol. The devices are capable of conversion rates of up to 100 ksps. The MCP3204/3208 devices operate over a broad voltage range (2.7V - 5.5V). Low current design permits operation with typical standby and active currents of only 500 nA and 320 µA, respectively. The MCP3204 is offered in 14-pin PDIP, 150 mil SOIC and TSSOP packages. The MCP3208 is offered in 16-pin PDIP and SOIC packages

- 12-bit resolution
- ± 1 LSB max DNL
- ± 1 LSB max INL (MCP3204/3208-B)
- ± 2 LSB max INL (MCP3204/3208-C)
- 4 (MCP3204) or 8 (MCP3208) input channels
- Analog inputs programmable as single-ended or

- pseudo-differential pairs
- On-chip sample and hold
- SPI serial interface (modes 0,0 and 1,1)
- Single supply operation: 2.7V - 5.5V
- 100 ksps max. sampling rate at V_{DD}= 5V
- 50 ksps max. sampling rate at V_{DD}= 2.7V
- Low power CMOS technology:
- 500 nA typical standby current, 2 µA max.
- 400 µA max. active current at 5V
- Industrial temp range: -40°C to +85°C
- Available in PDIP, SOIC and TSSOP packages





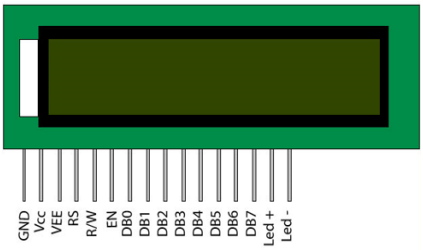
Name	Function
V_{DD}	+2.7V to 5.5V Power Supply
DGND	Digital Ground
AGND	Analog Ground
CH0-CH7	Analog Inputs
CLK	Serial Clock
D_{IN}	Serial Data In
D_{OUT}	Serial Data Out
$\overline{CS}$/SHDN	Chip Select/Shutdown Input
V_{REF}	Reference Voltage Input

Applications for the MCP3208 include data acquisition, instrumentation and measurement, multi-channel data loggers, industrial PCs, motor control, robotics, industrial automation, smart sensors, portable instrumentation and home medical appliances.

3.8 LCD

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. 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. The data is the ASCII value of the character to be displayed on the LCD. Click to learn more about internal structure of a LCD.



Pin No	Function	Name
1	Ground (0V)	Ground
2	Supply voltage; 5V (4.7V – 5.3V)	Vcc
3	Contrast adjustment; through a variable resistor	V_{EE}
4	Selects command register when low; and data register when high	Register Select
5	Low to write to the register; High to read from the register	Read/write
6	Sends data to data pins when a high to low pulse is given	Enable
7	8-bit data pins	DB0
8		DB1
9		DB2
10		DB3
11		DB4
12		DB5
13		DB6
14		DB7
15	Backlight V_{CC} (5V)	Led+
16	Backlight Ground (0V)	Led-

Since their interface serial/parallel pins are defined so its easy to interface them with many microcontrollers. Many products we see in our daily life have lcd's with them. They are used to show status of the product or provide interface for inputting or selecting some process. Washing machine, microwave,air conditioners and mat cleaners.M denotes number of coulombs and N represents number of rows. Like if the lcd is denoted by 16x2 it means it has 16 coulombs and 2 rows. Few examples are given below. 16x2, 8x1 and 8x2 lcd are shown in the picture below. Note the difference in the rows and coulombs.

On a character lcd a character is generated in a matrix of 5x8 or 5x7. Where 5 represents number of coulombs and 7/8 represent number of rows. Maximum size of the matrix is 5x8. You can not display character greater then 5x8 dimension matrix. Normally we display a character in 5x7 matrix and left the 8th row for the cursor. If we use the 8th row of the matrix for the character display, then their will be no room for cursor.

Lcd's have

- Eight(8) data pins D0-D7
- Vcc (Apply +5 volt here)
- Gnd (Ground this pin)
- Rc (Register select)
- Rw (read - write)
- En (Enable)
- V0 (Set Lcd contrast)

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.

RS(Register select)

A 16X2 LCD has two registers, namely, command and data. The register select is used to switch from one register to other. RS=0 for command register, whereas RS=1 for data register.

Command Register

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. Processing for commands happen in the command register.

Data Register

The data register stores the data to be displayed on the LCD. The data is the ASCII value of the character to be displayed on the LCD. When we send data to LCD it goes to the data register and is processed there. When RS=1, data register is selected.

Command codes for LCD

1	01	Clear display screen
2	02	Return home
3	04	Decrement cursor (shift cursor to left)
4	06	Increment cursor (shift cursor to right)
5	05	Shift display right
6	07	Shift display left
7	08	Display off, cursor off

8	0A	Display off, cursor on
9	0C	Display on, cursor off
10	0E	Display on, cursor blinking

3.9 I2C LCD MODULE FOR LCD

IC/I2C Interface Adapter Module is used for 16×2 LCD Display.It uses the PCF8574T IC chip which converts I2C serial data to parallel data for the LCD display.Also this interface module simplifies connecting an Arduino to a 16×2 Liquid Crystal display using only 4 wiresThese modules are currently supplied with a default I2C address of either 0x27 or 0x3F. To determine which version you have check the black I2C adaptor board on the underside of the module. If there a 3 sets of pads labelled A0, A1, & A2 then the default address will be 0x3F. If there are no pads the default address will be 0x27.
The module has a contrast adjustment pot on the underside of the display. This may require adjusting for the screen to display text correctly. The specifications are Interface:I2C;I2C Address:0x3F;Supply voltage: 5V;Contrast Adjust: Through Potentiometer;Backlight:Blue

LCDs are useful for creating standalone projects. This LCD Display utilizes an I2C interface, which means that fewer pins are necessary to use this product than would be needed with a regular 16x2 LCD Display (just four connections, VCC, GND, SDA & SCL are required). And it is backlit. I2C address is usually decimal 39, hex 0x27. These devices can sometimes be found at decimal 63, 0x3F. It is very easy to find an I2C address on Arduino by using i2c_scanner.

The PCF8574/74A provides general-purpose remote I/O expansion via the two-wire bidirectional I2C-bus (serial clock (SCL), serial data (SDA)).The devices consist of eight quasi-bidirectional ports, 100 kHz I2C-bus interface, three hardware address inputs and interrupt output operating between 2.5 V and 6 V. The quasi-bidirectional port can be independently assigned as an input to monitor interrupt status or keypads, or as an output to activate indicator devices such as LEDs. System master can read from the input port or write to the output port through a single register.. It is used to indicate to the microcontroller that an input state has changed and the device needs to be interrogated without the microcontroller continuously polling the input register via the I2C-bus.The internal Power-On Reset (POR) initializes the I/Os as inputs with a weak internal pull-up 100 microAmp current source.LCDs are useful for creating standalone projects. This LCD Display utilizes an I2C interface, which means that fewer pins are necessary to use this product than would be needed with a regular 16x2 LCD Display (just four connections, VCC, GND, SDA & SCL are required). And it is

backlit. I2C address is usually decimal 39, hex 0x27. These devices can sometimes be found at decimal 63, 0x3F. It is very easy to find an I2C address on Arduino by using i2c_scanner.

This has 2 I2C serial data pins (SDA & SCL) and so requires far less digital IO pins when controlled from a microcontroller. In total the module only requires 4 wires including 5V power and GND. Contrast adjustment is also provided by the daughter board via a potentiometer.

3.10 POWER SUPPLY

The LM2596 series of regulators are monolithic integrated circuits that provide all the active functions for a step-down (buck) switching regulator, capable of driving a 3-A load with excellent line and load regulation. These devices are available in fixed output voltages of 3.3 V, 5 V, 12 V, and an adjustable output version.Requiring a minimum number of external components, these regulators are simple to use and include internal frequency compensation, and a fixed-frequency oscillator.

The LM2596 series operates at a switching frequency of 150 kHz, thus allowing smaller sized filter components than what would be required with lower frequency switching regulators. Available in a standard 7-pin TO-220 package with several different lead bend options, and a 7-pin TO-263 surface mount package.

A standard series of inductors are available from several different manufacturers optimized for use with the LM2596 series. This feature greatly simplifies the design of switch-mode power supplies.

Other features include a ±4% tolerance on output voltage under specified input voltage and output load conditions, and ±15% on the oscillator frequency. External shutdown is included, featuring typically 80 µA standby current. Self-protection features include a two stage frequency reducing current limit for the output switch and an overtemperature shutdown for complete protection under fault conditions.

3.3-V, 5-V, 12-V, and Adjustable Output Versions,Adjustable Version Output Voltage Range: 1.2-V to 37-V ± 4%, Maximum Over Line and Load Conditions,Available in TO-220 and TO-263 Packages,3-A Output Load Current,Input Voltage Range Up to 40 V,Requires

Only 4 External Components,Excellent Line and Load Regulation Specifications,150-kHz Fixed-Frequency Internal Oscillator,TTL Shutdown Capability,Low Power Standby Mode, I_Q, Typically 80 µA,High Efficiency,Uses Readily Available Standard Inductors,Thermal Shutdown and Current-Limit Protection

3.11 BUZZER

A buzzer or beeper is an audio signalling device, which may be mechanical, electromechanical, or piezoelectric (*piezo* for short). Typical uses of buzzers and beepers include alarm devices, timers, and confirmation of user input such as a mouse click or keystroke.

Piezoelectric buzzers, or piezo buzzers, as they are sometimes called, were invented by Japanese manufacturers and fitted into a wide array of products during the 1970s to 1980s. This advancement mainly came about because of cooperative efforts by Japanese manufacturing companies. In 1951, they established the Barium Titanate Application Research Committee, which allowed the companies to be "competitively cooperative" and bring about several piezoelectric innovations and inventions.

Piezo buzzers are used for making beeps alarms and tones. They can be used in alarm systems, for keypad feedback, or some games. Light weight, simple construction and low price make it usable in various applications like car/truck reversing indicator, computers, call bells etc.

3.12 PUSH BUTTON

Pushbuttons or switches connect two points in a circuit when you press them. Connect three wires to the board. The first two, red and black, connect to the two long vertical rows on the

side of the breadboard to provide access to the 5v supply and ground. The third wire goes from digital pin 2 to one leg of the pushbutton. That same leg of the button connects through a pull-down resistor (here 10K ohm) to ground. The other leg of the button connects to the 5 volt supply.

When the pushbutton is open (unpressed) there is no connection between the two legs of the pushbutton, so the pin is connected to ground (through the pull-down resistor) and we read a LOW. When the button is closed (pressed), it makes a connection between its two legs, connecting the pin to 5 volts, so that we read a HIGH.

3.13 LED

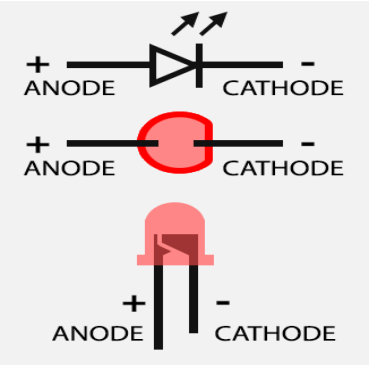
Light Emitting Diodes (LEDs) are all around us. They are in our homes, our cars, even our phones. LEDs come in a variety of shapes and sizes, this gives designers the ability to tailor them to their product. Any time something electronic lights up, there's a good chance that an LED is behind it. Their low power and small sizes make them a great choice for many different products as they can be worked into the design more seamlessly to make it an overall better device.

These are the types of LEDs that are likely to be in your smaller electronics as an indicator light or something of that nature. 5mm LEDs take much less current to run than high brightness LEDs, 20mA compared to a minimum of 350mA for high-power LEDs. If you followed our original Mastering LEDs post, you should know: more current = more light. So obviously these 5mm LEDs are going to be more of an accent light or light for very small spaces. This is exactly the purpose of 5mm LEDs, they can be used together in a large array to create a sign or some sort of matrix, or they can be used on their own to make a small indicator light or one of those tiny key chain flashlights.

Connnection is done by connecting the positive of your battery/power source to the Anode and your negative or ground to the Cathode. This will make sure polarity matches up and electricity will flow given you have enough input voltage, lighting up your 5mm LED. If you wire it backwards nothing will happen and the circuit will remain closed. In making sure you have enough power for your light emitting diode, there are two key ratings you should pay attention to when looking at LEDs specifications: the forward voltage and the forward current.Each LED should list a 'Forward Voltage' that defines the amount of voltage required in order to conduct electricity and produce light. If you try and supply anything less than this amount the LED will

remain open and non-conductive. Once the voltage dropped across an LED reaches the forward voltage, your LED will light up. If you have multiple LEDs in series, you must account for the sum of their forward voltage ratings.

In every other instance you need to limit the amount of current flowing through the LED. With high-power LEDs this is done with a constant current driver. 5mm LEDs current ratings are much lower, usually around 15-30mA, and we can control the current by placing a resistor in series with the LED. This is where you will hear the term current limiting resistor a lot as the resistor makes sure the current that flows through the circuit is significantly limited.LED wavelength is basically a very precise way of explaining the color of the light. For LEDs, there will be a variation in color as the manufacturing process is intense and sometimes there are slightly different wavelengths. On a 5mm LED specification sheet you will actually see a minimum and maximum wavelength. This wavelength is actually determined by the type of semiconductor material used to make the diode inside this 5mm package. The energy band structure of semiconductors varies between materials, so photons are emitted with differing frequencies which effects the light we see. Below is a full table of our LEDs and wavelength options. Some of the more popular colors we sell are Deep Red 660nm, Purple 420nm, Pink 440nm and UV 361nm.



5mm LEDs are a type of LED that hold the die on an anvil post that is encased in an epoxy dome for protection. Connections are then made via the two legs or prongs that come out of the bottom. As we mentioned, a diode only allows flow in one direction. This makes it crucial to differentiate between the positive side (the Anode) and the negative side (the Cathode).

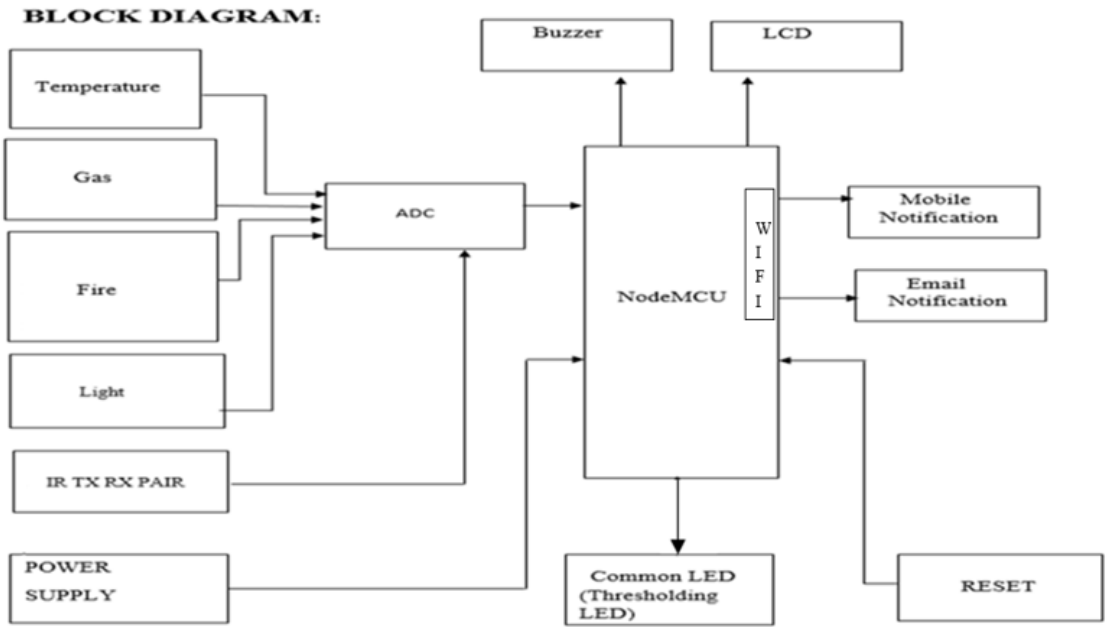
BILL OF MATERIALS

SL.NO	MATERIAL	COST
1	NodeMCU	Rs. 275
2	Temperature Sensor	Rs. 60
3	Gas Sensor	Rs. 100
4	Fire Sensor	Rs. 100
5	Light Sensor	Rs. 20
6	IR	Rs 100
7	ADC	Rs 100
8	LCD	Rs. 120
9	I2C LCD Module	Rs. 80
10	Power Supply Converter	Rs 80
11	Push Button	Rs.2
12	Led	Rs.2
13	Battery	Rs. 20
14	Bread board	Rs. 50
15	Prefboard	Rs 50
16	Connecting Wires	Rs 20
TOTAL		**Rs. 1179**

CHAPTER 4

PROPOSED METHOD

4.1 BLOCK DIAGRAM:



4.2 BLOCK DIAGRAM DESCRIPTION

The block diagram consists of Fire Sensor(Infrared Receiver Ignition Source Detection Module),Light Sensor(LDR 5mm Through-Hole),Temperature Sensor(LM350,Smoke Sensor(MQ2) and IR Sensor(IR Tx & Rx). Temperature Sensor is connected to Analog to digital Converter IC (pin0). Smoke Sensor is connected to Analog to digital Converter IC(pin1).Fire Sensor is connected to Analog to digital Converter IC(pin2).Light Sensor is connected to Analog to digital Converter IC(pin3). IR Sensor is connected to Analog to digital Converter IC(pin4). ADC is connected to NodeMCU using SELPIN,DATAOUT,DATAIN AND SPICLOCK OF D5,D6,D7,D8 of NodeMCU respectively.Power Supply is given to NodeMCU using external power source via USB cable.The indicators used are LCD ,Buzzer,Common Led.LCD is connected to D1and D2 of NodeMCU Controller.Buzzer is connected to D0 pin of NodeMCU Controller.Led is connected to D0 pin NodeMCU Controller.The Wi-Fi Module is Connected In-Built in NodeMCU Controller.A RESET push button is provided incase of emergency.

4.3 METHOD OF IMPLEMENTATION

In this project, we proposed a system where you can easily monitor the different parameters using Sensors. To prepare this arrangement, we used a popular open source IOT platform microcontroller board known as NodeMCU. It has only one Analog pin(A0) and 9 Digital pins(D0-D8). It comes with an in-built Wi-Fi module known as ESP-8266. This Wi-Fi platform connects to BLYNK IOT cloud, which is interfaced you to your mobile phone. Here we used five sensors for the monitoring the Industrial System. In which all component plays crucial role & have individual responsibilities.

Since we used five sensors which three sensors (Temp, Light and Smoke) are analog sensors take its input as analog signal, two sensors (Fire and IR) have digital output, an ADC is used to convert the analog input into digital output. These sensors are interfaced to the ADC. The ADC that is used in this system is MCP3208. The output of ADC is connected to NodeMCUcontroller.A Temperature sensor, popularly known as LM35 sensor is used to monitor the temperature inside the industry when it raises above the threshold value of 35, the module sends a message through the IOT platform to mobile phone and e-mail notification through Iot Cloud.

In the case with the Smoke sensor. When the Smoke quantity increases above the threshold value of 45, the system sends a SMS to mobile phone and e-mail notification through IOT cloud.Light Sensor is used to detect the Light whenever decreases below the threshold value of 25, when there is no light is detected the system sends a notification to mobile phone and e-mail notification through IOT cloud.Fire Sensor detects the fire, the system sends a notification to mobile phone and e-mail notification through IOT cloud.IR Sensor is used as presence detection Sensor, when ever a person enters into Restricted Areas the system sends a notification to mobile phone and e-mail notification through IOT cloud. LCD , Buzzer and Common Led are used as indicator in which LCD is used to Display the Detected Values.
BLYNK The Cloud which is used as cloud platform in this Industrial Monitoring System.

PROGRAM

```
#include <SimpleTimer.h>
#include <ESP8266WiFi.h>
#define BLYNK_PRINT Serial
#include <BlynkSimpleEsp8266.h>
#include <Wire.h>
#include <LiquidCrystal_I2C.h>
LiquidCrystal_I2C lcd(0x27,16,2);
SimpleTimer timer;
// You should get Auth Token in the Blynk App.
// Go to the Project Settings (nut icon).
char auth[] =
"34a7a951dfae45cbb7acfd40bc8ff175";
const char *ssid =  "moto";//WIFI Name
const char *password =  "12345678";//WIFI
Passcode
WiFiClient client;
#define SELPIN D5 //Selection Pin
#define DATAOUT D6//MOSI
#define DATAIN  D7//MISO
#define SPICLOCK  D8//Clock
#define LED_BUILTIN D0
int readvalue1;
int readvalue2;
int readvalue3;
int readvalue4;
int readvalue5;
void repeatMe()
{
int y1,y3,y4,y5;
//TEMPERATURE
lcd.setCursor(5,0);
readvalue1=read_a dc(1)*0.02;
int x1= (int)readvalue1;
y1=x1+25;
Blynk.virtualWrite(V0,y1);
lcd.print(y1);
if(y1<=34)
{

digitalWrite(LED_BUILTIN, LOW);
}
else
{
Blynk.notify("High Temperature");
Blynk.email("spavanraj97@gmail.com",
"Temperature", "High Temperature");
digitalWrite(LED_BUILTIN, HIGH);
}
Serial.println("Temperature value is ");
Serial.println(y1);
delay(500);
//SMOKE
lcd.setCursor(14,0);
readvalue2 = read_adc(2)*0.02;
int x2= (int)readvalue2;
lcd.print(x2);
Blynk.virtualWrite(V1,x2);
if(x2>=50)
{
Blynk.notify("Smoke Detected");
Blynk.email("spavanraj97@gmail.com", "Smoke",
"Smoke Detected");
digitalWrite(LED_BUILTIN, HIGH);
}
else
{
digitalWrite(LED_BUILTIN, LOW);
}
Serial.println("Smoke value is ");
Serial.println(x2);
delay(500);
//FLAME
lcd.setCursor(5,1);
readvalue3 = read_adc(3)*0.02;
int x3= (int)readvalue3;
y3=x3+18;
Blynk.virtualWrite(V2,y3);
lcd.print(y3);
if(y3<87 || y3<90)
{
Blynk.notify("Fire Detected");
Blynk.email("spavanraj97@gmail.com", "Fire",
"Fire Detected");
digitalWrite(LED_BUILTIN, HIGH);
}
else
{
digitalWrite(LED_BUILTIN, LOW);
}
Serial.println("Fire value is ");
Serial.println(y3);
delay(500);
delay(500);
//LIGHT
lcd.setCursor(14,1);
readvalue4 = read_adc(4)*0.02;
int x4= (int)readvalue4;
y4=x4+20;
Blynk.virtualWrite(V3,y4);
lcd.print(y4);
if(y4<=22)
{
Blynk.notify("No Light");
Blynk.email("spavanraj97@gmail.com", "Light",
"No Light");
digitalWrite(LED_BUILTIN, HIGH);
}
else
digitalWrite(LED_BUILTIN, LOW);
Serial.println("Light value is ");
Serial.println(y4);
delay(500);
//IR
readvalue5 = read_adc(5)*0.02;
```

```
int x5= (int)readvalue5;
y5=x5+18;
Blynk.virtualWrite(V4,y5);
lcd.print(y5);
if(y5<=90)
{
Blynk.notify("Motion Detected");
Blynk.email("spavanraj97@gmail.com", "IR",
"Motion Detected");
digitalWrite(LED_BUILTIN, HIGH);
}
else
{
digitalWrite(LED_BUILTIN, LOW);
}
Serial.println("Motion value is ");
Serial.println(y5);
delay(500);
}
//Initialize all variable for ADC and LCD before
starting the code
void setup()
{
//ADC
Serial.begin(9600);
Blynk.begin(auth, ssid, password);
WiFi.begin(ssid, password);
pinMode(SELPIN, OUTPUT);
pinMode(DATAOUT, OUTPUT);
pinMode(DATAIN, INPUT);
pinMode(SPICLOCK, OUTPUT);
digitalWrite(SELPIN,HIGH);
digitalWrite(DATAOUT,LOW);
digitalWrite(SPICLOCK,LOW);
Serial.begin(9600);
Serial.begin(9600);
timer.setInterval(1000, repeatMe);
pinMode(LED_BUILTIN, OUTPUT);
pinMode(D5, OUTPUT);
//LCD
lcd.init();
lcd.clear();
lcd.backlight();
lcd.setCursor(3, 0);
lcd.print("INDUSTRIAL");
lcd.setCursor(0, 1);
lcd.print("MONITERINGSYSTEM");
delay(3000);
lcd.backlight();
lcd.setCursor(0,0);
lcd.print("TEMP:");
lcd.setCursor(8,0);
lcd.print("SMOKE:");
lcd.setCursor(0,1);
lcd.print("FIRE:");
lcd.setCursor(8,1);
lcd.print("LIGHT:");
lcd.setCursor(7,0);
lcd.print("|");
lcd.setCursor(7,1);
lcd.print("|");
}
//Loop to run continuous
void loop()
{
timer.run();
Blynk.run();
}
int read_adc(int channel)
{
int adcvalue = 0;
byte commandbits = B11000000;
commandbits|=((channel-1)<<3);
digitalWrite(SELPIN,LOW);
for (int i=7; i>=3; i--)
{
digitalWrite(DATAOUT,commandbits&1<<i);
digitalWrite(SPICLOCK,HIGH);
digitalWrite(SPICLOCK,LOW);
}
digitalWrite(SPICLOCK,HIGH);
digitalWrite(SPICLOCK,LOW);
digitalWrite(SPICLOCK,HIGH);
digitalWrite(SPICLOCK,LOW);
for (int i=11; i>=0; i--)
{
adcvalue+=digitalRead(DATAIN)<<i;
digitalWrite(SPICLOCK,HIGH);
digitalWrite(SPICLOCK,LOW);
}
digitalWrite(SELPIN, HIGH);
return adcvalue;
}
```

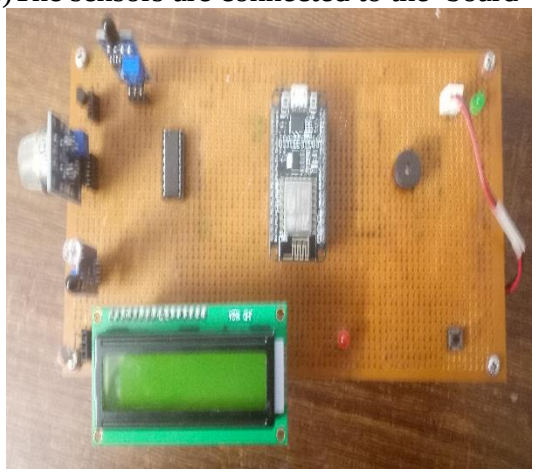
CHAPTER 5

RESULTS

Based on the problem concern we have combined both the hardware and software together and developed a prototype model. The code we implemented for this module had been accomplished and verified by programming and testing each of the sensors and then combining all the sub programs to make a complete solution for programming this module.

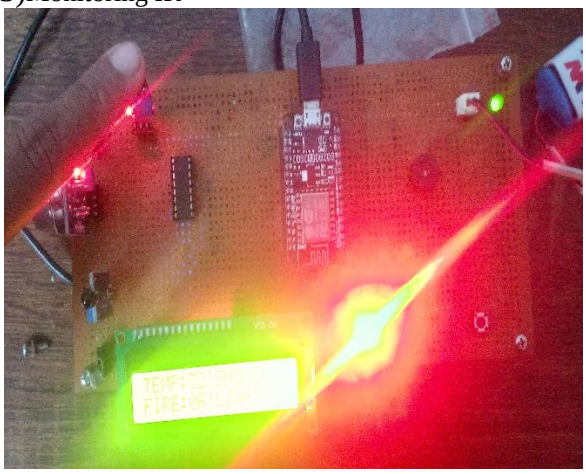
Now the complete working can be explained and understood by the use of pictures shown below

1)The sensors are connected to the board

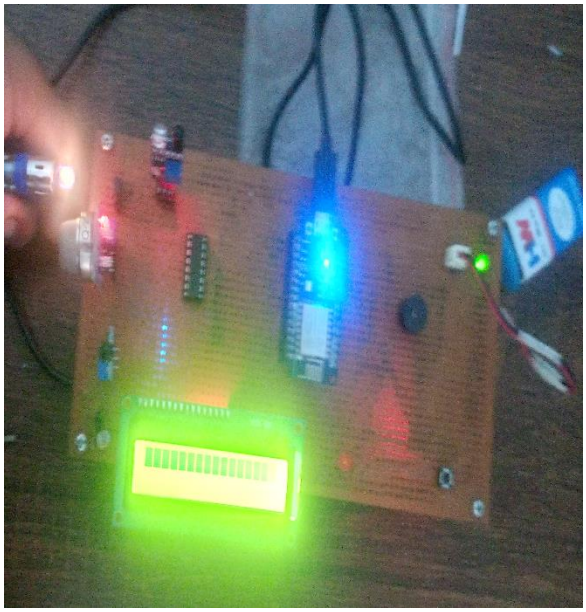


2) Power Supply is given to the board

3)Monitoring IR

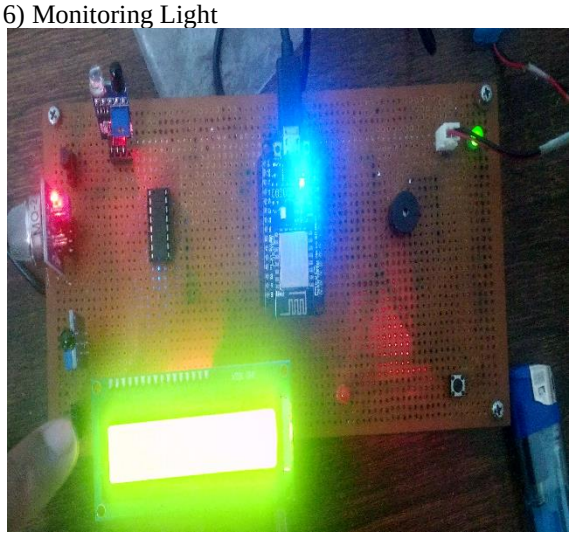


4)Monitoring Temperature

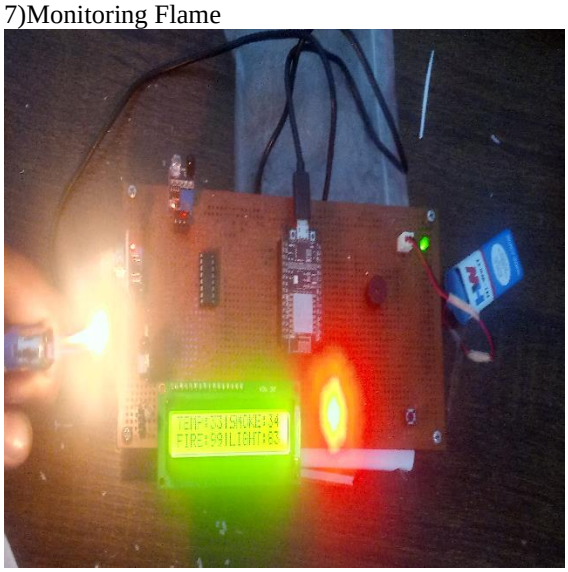


5) Monitoring Smoke

6) Monitoring Light

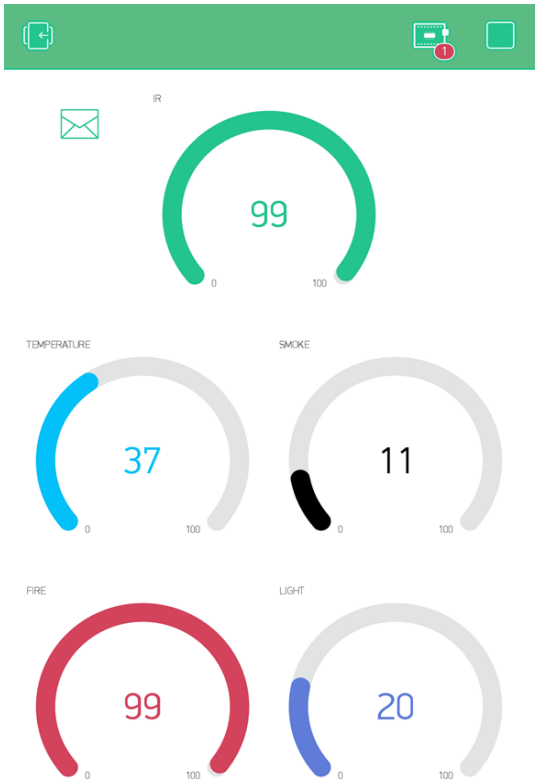


7)Monitoring Flame

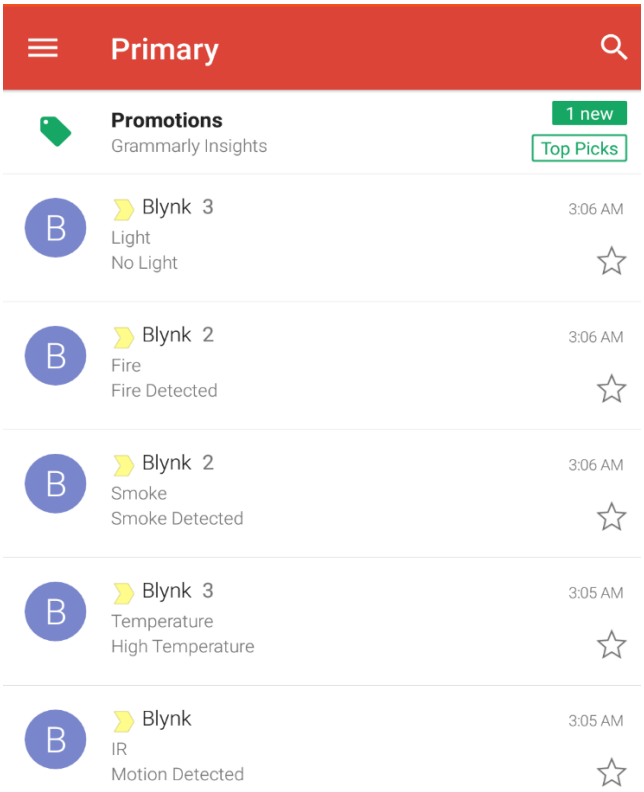


8)LCD

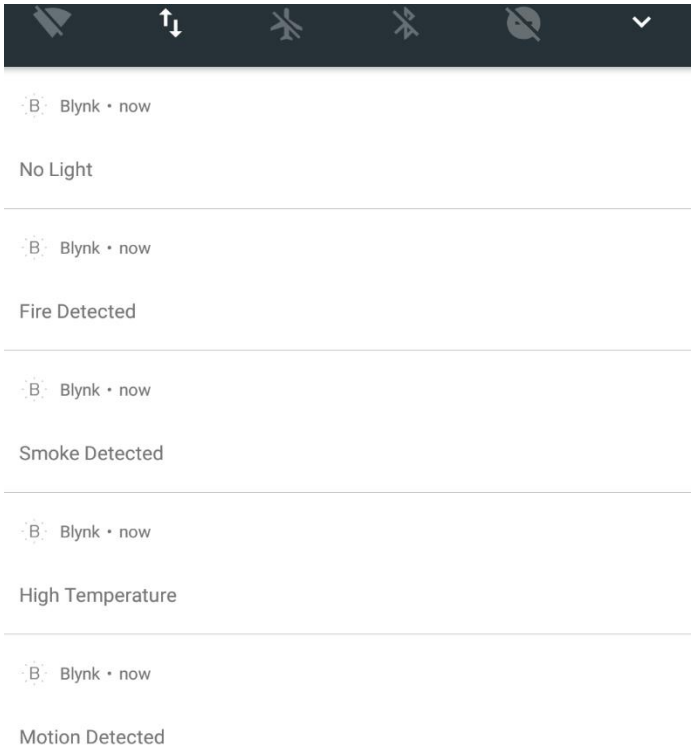
9)Mobile Dashboard



10)Email Notification Alert



11)Mobile Notification Alert



CHAPTER 6

APPLICATIONS AND ADVANTAGES

6.1 APPLICATIONS

This prototype model can be used to monitor the industrial parameters individually due to this it requires more manpower and time to monitor them continuously where maintaining such procedure is very difficult and any misinterpretation occurs than that may lead a huge loss to the industry.

6.2 ADVANTAGES:

- Low Cost
- Reliable and Long Lasting
- Portable
- Low Power
- Low Manpower
- Compact Design
- Continuous Monitoring
- More number of parameters can be monitored

CHAPTER 7

CONCLUSION AND FUTURE SCOPE

7.1 CONCLUSION

We improve this project by implementing this project to add more sensors and make it more accurate and control more number of parameters by using the IOT.In this competitive world of industrial sectors all factories have been modernized using automation the industrial automation has played an important role in manufacturing centers in our projects we have suggested an innovation proposal which will take Automation Monitoring in industries .The proposed model of System has several distinct advantage over the existing technology . The handle large amount of data , monitor the power consumption and internal parameters Temperature, Smoke, Fire, Light and Motion Detection with the help of sensor network and NodeMCU also play an important role in the system.

7.2 FUTURE SCOPE

Since the turn of the century, the global recession has affected most businesses, including industrial automation. After four years of the new millennium, here are my views on the directions in which the automation industry is moving. Automated factories and processes are too expensive to be rebuilt for every modification and design change – so they have to be highly configurable and flexible. To successfully reconfigure an entire production line or process requires direct access to most of its control elements – switches, valves, motors and drives down to a fine level of detail.

In industries, there would be a set of technologies that are implemented to get the desired performance or output, making the automation systems most essential for industries. On the other hand, industrial automation involves usage of advanced control strategies such as cascade controls, control hardware devices and other instruments for sensing the control variables etc.

In industries, there would be a set of technologies that are implemented to get the desired performance or output, making the automation systems most essential for industries. On the other hand, industrial automation involves usage of advanced control strategies such as cascade controls, control hardware devices and other instruments for sensing the control variables etc.

This has been designed to monitor and handle the machines automatically even if there are less or no workers available. The number of machines which are to be automated are yet to be added. Every change should be intimated to the server and there should be a display regarding the work which is being done.We improve this project by implementing this project to add more sensors and make it more accurate, and control more number of parameter

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