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IOT BASED INDUSTRIAL AUTOMATION AND MONITORING

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Abstract - This paper is on the smart panel for controlling the appliances. For this purpose user can use android kind of mobile. Appliances are Inductive, resistive and capacitive in nature. Three-phase Induction motor is one amongst the foremost common sorts of electrical machines with vast amount of applications within the entire installation everywhere the planet because of its various advantages like low starting power, lower maintenance cost etc. Control elements used here are vibration still temperature sensation with IOT based remote data acquisition technique for automatic protection likewise as a manual control employing a electrical switch for automatic in addition as manual operation and a circuit breaker for safety purpose.

Key Words: IoT, MQTT, Blynk, Sensors etc

1.INTRODUCTION

A industrial automation system is simply a system that allows users to have access to electrical control system devices like motor starters and drivers and monitoring number of different parameters in industrial control room or working area like temperature & Humidity monitoring, LPG gas leakage or smoke alert through notification, Fire Alert , Mechanical fault detection through vibration sensor, monitoring human presence in restricted area etc. These all access is monitored through a basic application connected to the main system through a wireless protocol or MQTT (MQ Telemetry Transport) protocol, there are number of open source IoT platforms like Blynk, Adafruit I/O, Ubidots, Thing Speak etc. through these IoT servers we can simply made a Industrial Automation & Monitoring System.

In this paper we will create the main system which is an electronic circuit board based on a NodeMCU dev board or (Wemos D1 mini Board) which already has a wifi feature in it and this board will be surrounded by some electronic components like Relays and Sensors, about the sensors we will use the MQ-2 Gas sensor for Smoke & LPG Gas leakage detection, and a DHT11 sensor for monitoring temperature & humidity.

About the actuators, we will control some 220V AC bulbs or 12V DC Lights and a 220V AC Fan or 12V DC fan and all these Loads will be controlled through Blynk IoT Platform which has an android app called Bynk that we have to install from the play store. So in this application we inserted some gauges to read the analog values from the sensors and placed some buttons to control outputs.

Figure 1: IoT based Industrial Automation & monitoring

2. METHODOLOGY

In our paper we will create the main system which is an electronic circuit board based on a NodeMCU board which already has a wifi feature in it and this board will be surrounded by some electronic components like Relays and Sensors, about the sensors we will use the MQ-2 Gas sensor for Smoke & LPG Gas lekage detection, and a DHT11 sensor for monitoring temperature & humidity, Flame Sensor for Fire Alert , Proximity sensor for obstacle detection, PIR sensor for human presence detection, vibration sensor for Mechanical fault detection etc

About the actuators, we will control 3ph DOL starter contactor and 12V DC exhaust Fan and buzzer for Fire and gas leakage alert . The DOL Starter will be controlled through Blynk IoT Platform which has an android app called Bynk that we have to install from the play store. So in this application we inserted some gauges to read the analog values from the sensors and placed some buttons and timer to control outputs.

Blynk is an open source application and anybody can use it in their Home Automation to control devices, monitor sensor data and get a notification by some trigger actions.

The Blynk app transmits signals simply by turning ON/OFF buttons in App via internet, the Wi-Fi receiver module receive these signals. Depending on the received character NodeMCU takes various actions to turn ON and OFF (HIGH/LOW) the GPIO pins of the NodeMCU and then from that signal the Relay Driver circuit turn the Starter ON/OFF. similarly by pressing manual push buttons also controls the Starter Through NodeMCU and relay, at that time it also gives a feedback status of Starter switch in the App by simply toggling the button in App. And in the same way the sensors sends the data to the microcontroller unit and then via internet those sensor data values are displayed or Alert notifications will be notified in the Blynk android App.

For controlling the Starter at s specific period we have designed a simple countdown timer circuit by using Arduino Uno, 4×3 Keypad and a LCD Display , to control the starter for a specific amount of time the operator can simply enter the total number of minutes and seconds by using Keypad then the Arduino code converts the total time in seconds and displays on the LCD Display after few seconds the countdown starts and the Arduino triggers the relay which then turns the starter ON .. and when the countdown reach to zero (0) the Arduino sends 0 voltage signal to relay then the starter gets off.

3. MODELING AND ANALYSIS

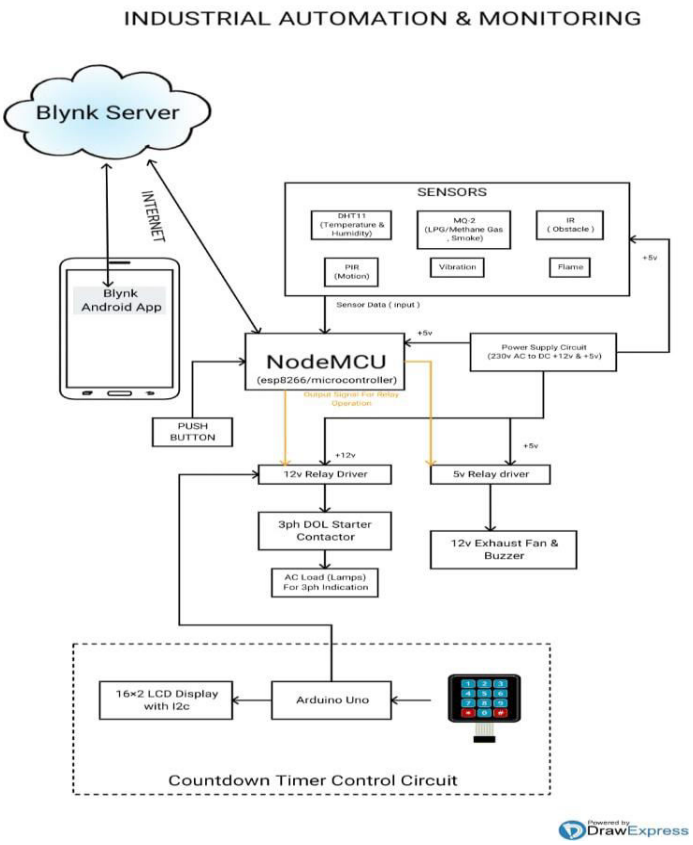

Figure 1: Block Diagram

4. RESULTS AND DISCUSSION

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 or NodeMCU.

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

Now imagine: every time you press a Button in the Blynk app, the message travels to space the Blynk Cloud, where it magically finds its way to your hardware. It works the same in the opposite direction and everything happens in a blynk of an eye.

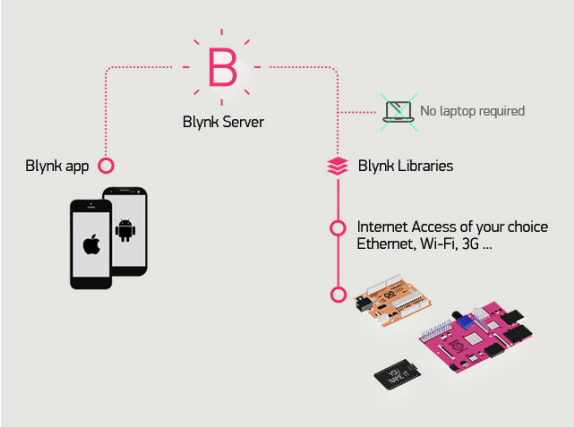

Figure 2.1 Blynk App

Features:

- Similar API & UI for all supported hardware & devices
- Connection to the cloud using:
  - WiFi
  - Bluetooth and 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.
- new features are constantly added!

Figure 2.2: Industrial Automation Using Blynk App

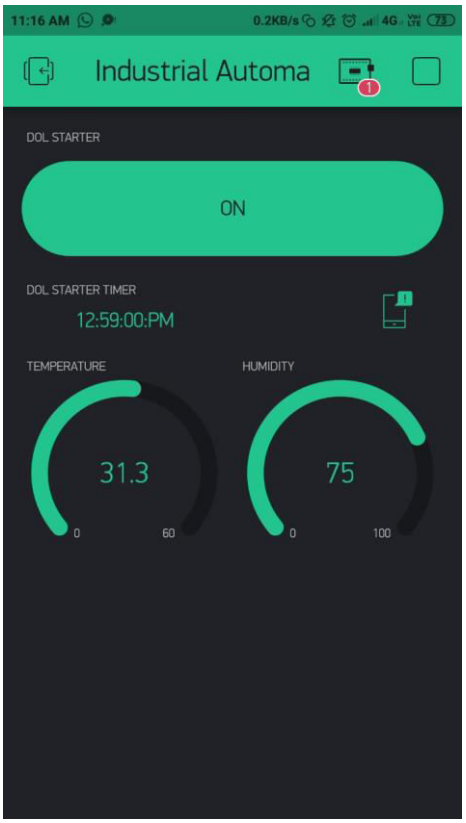

Figure 2.3: Industrial Automation Using Blynk App

Hardware.

An Arduino, Raspberry Pi, NodeMCU or a similar development kit.

Blynk works over the Internet. This means that the hardware you choose should be able to connect to the internet. Some of the boards, like Arduino Uno will need an Ethernet or Wi-Fi Shield to communicate, others are already Internet-enabled: like the ESP8266, Raspberri Pi with WiFi dongle, Particle Photon or SparkFun Blynk Board. But even if you don't have a shield, you can connect it over USB to your laptop or desktop (it's a bit more complicated for newbies, but we got you covered). What's cool, is that the list of hardware that works with Blynk is huge and will keep on growing.

A Smartphone: The Blynk App is a well designed interface builder. It works on both iOS and Android.

3. CONCLUSIONS

The paper has been experimentally proven to work successfully. We can control the parameters of the AC components using the Blynk app. Experimental work has been carried out carefully. The result shows a solution for remote turn on/off control over appliances and higher flexibility is indeed achieved using IoT.

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