IoT Based DC Motor Control

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Problem Statement :

1.1 Problem Statement:

The DC motors are widely used in the industrial drives due to its advantages such as low cost and versatility yet controlling of speed using stator control is of short range. This problem can be solved by using power electronic devices and controlling of firing angle. The objective is to control the speed of induction motor using stator control. This hardware gives input signal to microcontroller, which in turns controls the input of power electronic devices. By controlling the firing angle of semiconductor power device with the help of Arduino Uno, the terminal voltage across the stator winding of the motor can be varied to achieve the speed control of DC motor. These are easy to operate and can be controlled using smartphone.

Proposed Solution :

1.2 Proposed Solution:

Internet was used in the earlier times only for basic communication and information sharing .However, the evolution of internet has brought about a boom in the world by the concept of Internet of Things. Today the power of internet is applied for doing many tasks like controlling a remotely placed server machine from anywhere in the globe. Supported by the internet, came the concept of smartphones which have aided the same by a great extent. Application specific android applications have been developed which perform tasks and minimize the human effort by a great extent. The proposed system allows the control person to control the system just by a click on his smart-phone. Alternatively, personal computers can also be used for the same. The system consists of very simple and easy to use equipment's which can handle tasks as big as controlling the traction of any machinery using the concept of Internet of Things (IOT).

Overview

- **This project is a combination of IoT and Power Electronics.**
- **We are going to control the speed of the DC motor through a webpage.**

Goals

1. **Understand the concept of power electronics and DC Motor behavior.**
2. **Interfacing of esp8266 and Arduino UNO with the circuit.**

Specifications

Components Used :

Sr.No	Component Name	Description
1	Arduino UNO Microcontroller	Used for programming
2	ESP8266 NodeMCU Wifi module	Used for Wifi (iot) interfacing
3	DC Motor	Used in different fields
4	Transformer (9-0-9)v	Used to produce dc voltage
5	Thyristors (SCRs)	2p4m model no, qty - 2
6	Diodes (simple)	2N7000 model no, qty - 5
7	Special Diodes	Qty - 8
8	Optocouplers	MOC8050m qty - 2
9	Resistors 1k ,10k ,330 ohm	Total 7
10	Connecting wires	-

| Sr.No.	Software Used	Description
1	Eagle Software	Used for PCB designing.
2	Arduino IDE software	Used for Programming.

Working :

- AC mains supply is connected to Zero crossing ckt which is used to create interrupt signals , that interrupt signal is connected to the Arduino as an input. As we are going to change the speed of the DC motor , we are changing the width of the Interrupt pulses for that purpose we are going to program Arduino UNO.
- The output of Arduino is given to the next Optocoupler ckt which is basically used to provide the isolation between AC and DC circuits.
- The Optocoupler ckt output is given to the SCR (Semi Converter Rectifier)ckt or also known as Thyristor Ckt which acts as a driving ckt to the motor.
- Pins of ESP8266 are connected to ON /OFF the MOTOR and potentiometer (WEB SLIDER) pin is connected to the Arduino Analog Connector to change the Width of the Interrupt signal ultimately to change the speed of the Motor.
- All the above circuitry is used to control the Armature Windings of the DC Motor.
- Bridge rectifier ckt is separately used to provide AC rectified output to the field windings of the DC motor which is kept constant.
- Interfacing of esp8266 with the other circuit is done by using the iot concept. For that purpose I have used THINGSPEAK open cloud database platform which can be used to update the live data in the channel.
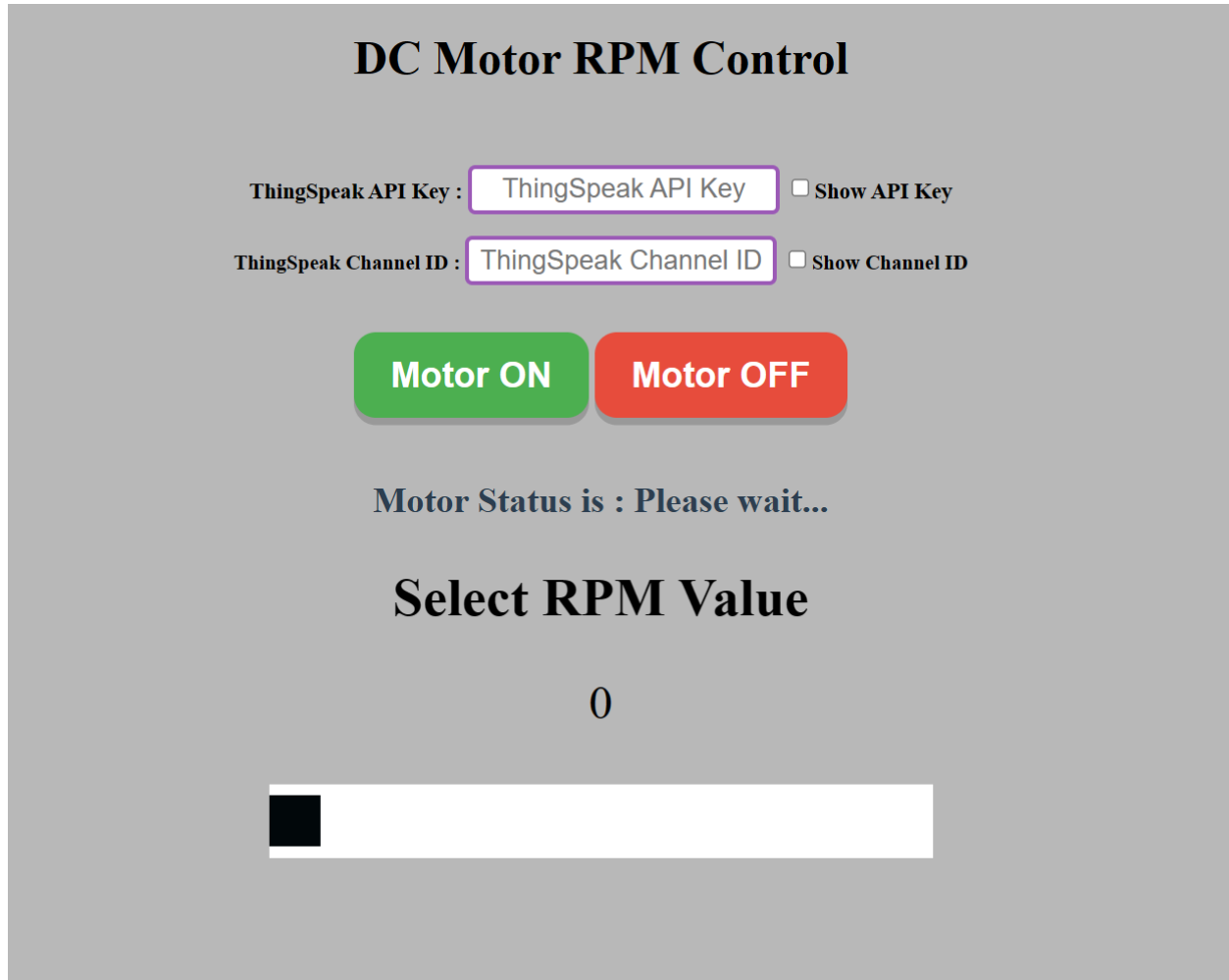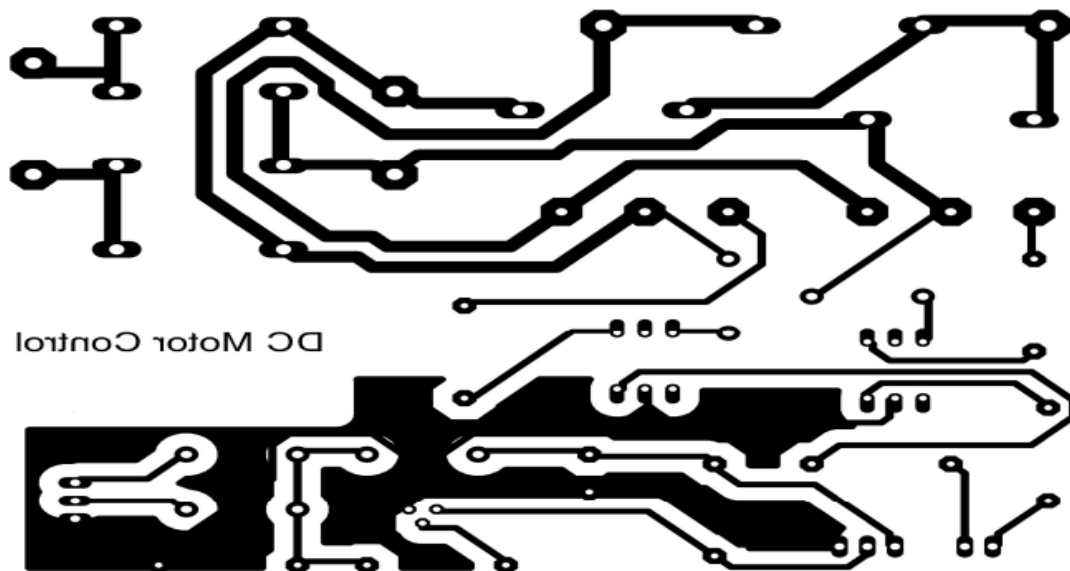
Block Diagram :
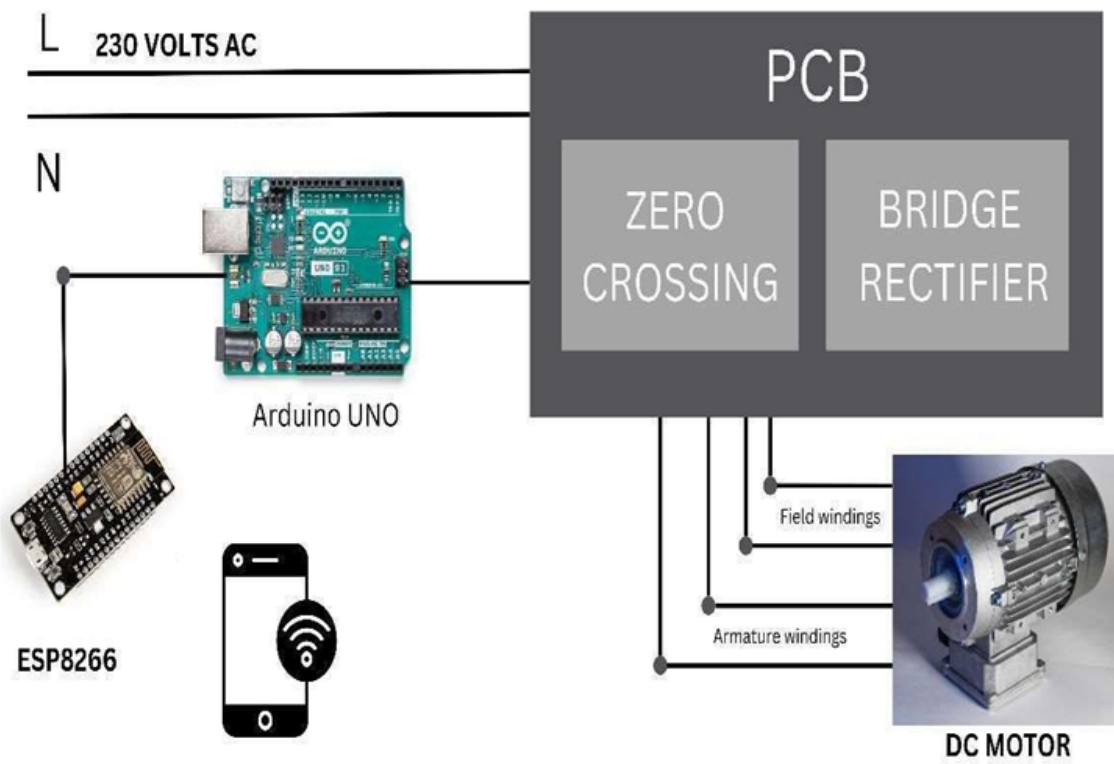
Circuit design :
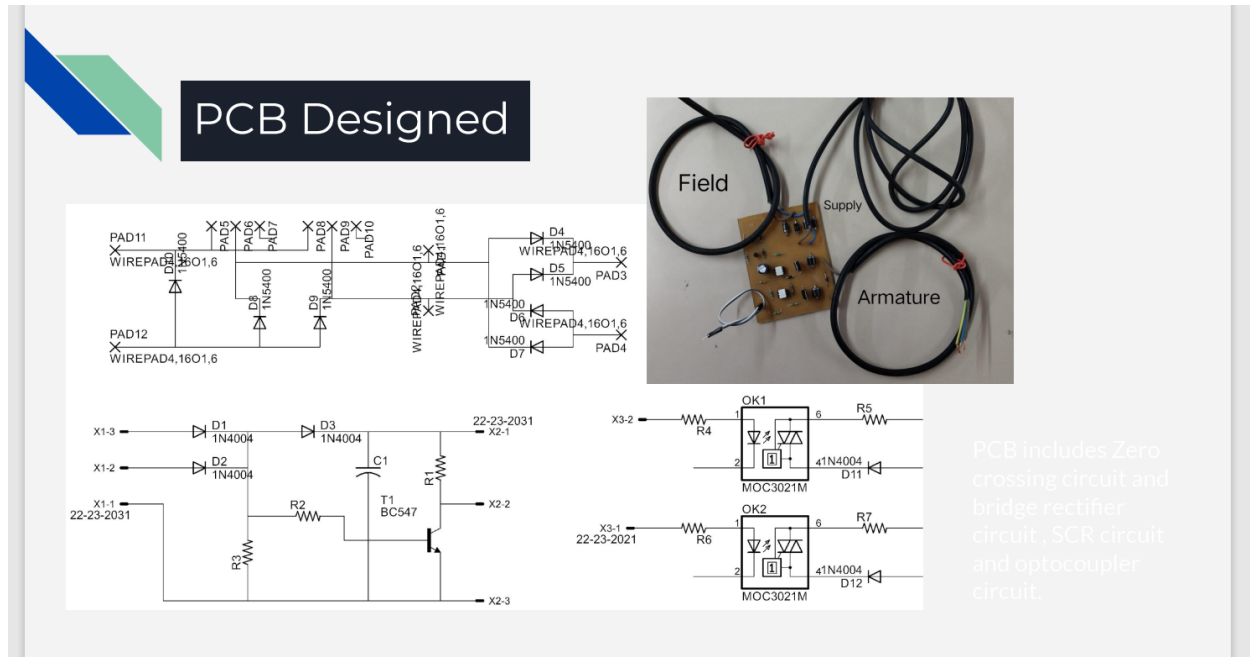
Negative of PCB :

Webpage :

DC Motor RPM Control

ThingSpeak API Key : [ThingSpeak API Key] ☐ Show API Key

ThingSpeak Channel ID : [ThingSpeak Channel ID] ☐ Show Channel ID

Motor ON   **Motor OFF**

Motor Status is : Please wait...

Select RPM Value

0

- **We have to enter the Thingspeak API key and channel ID to Switch ON/OFF the motor from this webpage.**
- **Once the Motor Status is displayed as ON we can use the slider box to change its rpm i.e speed of the DC Motor.**

Webpage Link :

https://control-page-by-ag.netlify.app/

Codes used :

- **Arduino code link :**

https://docs.google.com/document/d/e/2PACX-1vRkGYjcje5Fnr48Yy4Uz7MCSOyMAYCwWLblUaNFqmP2uzFlvuR4P62QeMooP-15AwhZneOAiJWLtvk0/pub

- **Esp8266 code link :**

https://docs.google.com/document/d/e/2PACX-1vTY4wHMP63qa2MUTNIIIolSZlgNFZw1LBqPYDDpoVZ4gisePoCjnJVZT8kmwqvNKJDXOCTmv07b4Fje/pub

- **Procedure to create channel on Thingspeak software :**

https://docs.google.com/document/d/e/2PACX-1vRdPz7oOf1ulhpLKmcpM0fjTe_v4UqRj9hHPv0Op4AY2XoJkmc-nBeRO6YEewBWhMWO04wGeXLXd4hT/pub

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www.ijera.com ISSN : 2248-9622, Vol. 10, Issue 11, (Series -III) November 2020, pp.06-10

2) SPEED MONITORING AND CONTROLLING OF MOTOR USING (IOT) ENHANCED WITH WI-FI 1Mr.P.Balaji, 2Mr.A.Karthick, 3Mr.R.Murali, 4Mr.M.Sudhakaran, 1,2UG Student, Dept. of EEE, Ganadipathy Tulis's Jain Engineering College, Vellore, India, 3 Assistant Professor, Dept. of EEE, Ganadipathy Tulis's Jain Engineering College, Vellore, India, 4Associate Professor, Dept. of EEE, Ganadipathy Tulis's Jain Engineering College, Vellore, India.

Conclusion :

Thus we can control the speed of the DC motor from anywhere by changing the slider through the webpage with the help of iot and do the operations.

Future Scope :

In the future lot of scope is there for IoT applications. Worldwide wide all overuse the IoT application for human life sophisticated. In 2025 millions of things connect to the cloud. A lot of research also done on IoT and it's more uses for human life's easiest purpose. Some research works on defence services for security and surveillance, some on automatic vehicle control and traffic signal control, some on the medical field for body control and health care, some on electronic devices, smart home, etc.