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Review Paper on Closed Loop Control of BLDC Motor By Using IOT

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Abstract:

This paper discuss about control of the Brushless DC (BLDC) motor by using IOT. The demand for low cost BLDC motor has increased in industrial applications. This system used in many industrial application, such as robotics, actuation and manipulators. The purpose of this project is to control the ON/OFF of BLDC motor by using IOT. The Internet Of Things (IOT) refers to ever growing network of physical objects that features an Internet Protocol(IP) address for internet connectivity and the communication that occurs between these object and other internet enabled devices and systems. The BLDC Motor has been widely used in industries because of its properties such as high efficiency, long operating life, high dynamic response, high weight to torque ratio.

Keywords **— Brushless DC(BLDC)motor, IOT, IP**

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I. INTRODUCTION

The Internet Of Things (IOT) is that the community of bodily items or "things" embedded with electronics, software, sensors, and community connectivity, which permits those items to gather and trade records. A "Thing" inside the context of the internet Of Thing (IOT) is an entity or item that functions a novel identifier, an embedded gadget and additionally the power to switch records over a community. the net of Thing (IOT), additionally someday said due to the fact the internet Of Everything (IOE), encompass all of the web-enabled gadgets that gather, ship and act on records they accumulate from their surrounding environments the usage of embedded sensors, processors and conversation hardware. These gadgets, frequently referred to as "related" or "clever" gadgets, can every so often go to different associated gadgets, a technique referred to as gadget-to-gadget(M2M) conversation, and act at the expertise they get from one another. In 2013 the global Standards Initiative on Internet Of Things (IOT-GSI) described the IOT as "the infrastructure of the data society." The IOT permits items to be sensed or managed remotely throughout current community infrastructure, growing possibilities for greater direct integration of the bodily global into computer-primarily based totally systems, and ensuing in stepped forward efficiency, accuracy and monetary advantage moreover to reduces human intervention. The connectivity, networking and conversation protocols used with those web-permits gadgets in large part depend upon the suitable IOT software deployed. Internet Of Thing (IOT) also can employ computing (AI) and gadget gaining

knowledge of ti resource in making records amassing procedures less difficult and greater dynamic. the net Of Thing (IOT) enables humans stay and paintings smarter, additionally as benefit whole manipulate over their lives. IOT permits agencies to automate procedures and decrease hard work cost. Internet Of Thing (IOT) is one of the predominant crucial technology of lifestyle, and it's going to nevertheless broaden steam as greater groups comprehend the capacity of related gadgets to stay them competitive. Generally IOT is maximum considerable in manufacturing, transportation and software corporations, using sensor and different IOT gadgets; however, it's also determined use instances for corporations inside the agriculture, infrastructure and home automation industries, main a few corporation in the direction of virtual transformation. Experts estimate that the IOT will includes nearly 50 billion items with the aid of using 2020. Current marketplace examples encompass domestic automation (additionally referred to as clever domestic gadgets) similar to the manipulate and automation of lightning, heating (like clever thermostat), ventilation, aircon (HVAC) systems, and home equipment like washer/dryers, robotics vacuums, air purifiers, ovens that use Wi-Fi for Remote monitoring. moreover due to the fact the enlargement of Internet- related automation right into a plethora of recent software areas. IOT is moreover predicted to go back up with big quantity of records from various location, with the consequent necessity for brief aggregation of the expertise, and an boom inside the ought to index, , and technique such records greater effectively.

II. BLOCK DIAGRAM

Here is the block diagram of closed loop control for a brushless dc (BLDC) motor to run at the exactly entered speed system with all their essential components.
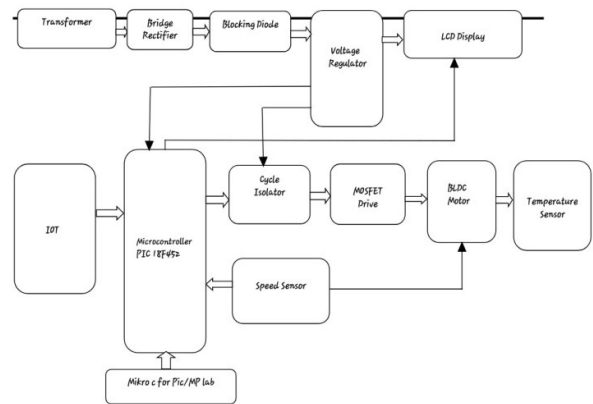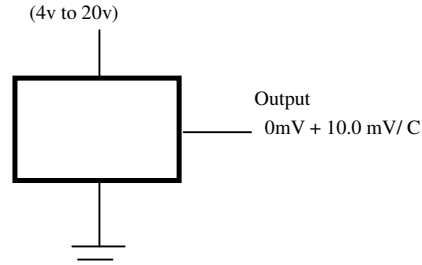

Fig: Block diagram of Closed loop control of BLDC motor by using IOT

III. WORKING

Closed loop manage for a brushless dc motor to run on the precisely entered pace is a device that controls the BLDC (brushless dc) motor pace in line with the person described pace. In different words, this device runs the motor at 25%, 50% or 75% of the entire pace while person set this percent of pace from virtual keypad. Different variable pace pressure are to be had however right here we've designed this device with the assist of closed loop manage strategies This device has designed with the assist of step down ac transformers, bridge rectifier, voltage regulator, LCD display, microcontroller pic18F452 belongs to percent family, MOSFET, pace sensors and OPTO isolator for the using the BLDC motor. This closed loop manage for a brushless DC motor device works at the precept of PWM (Pulse Width Modulation) manage. In PWM manage, the responsibility cycle of using pulse is modified manner pulse on or off time is modified. When this time is modified then output voltage are modified and through converting this output voltages BLDC motor pace is modified. This device is immediately coupled with 230V ac, due to the fact this device includes digital additives consequently those voltages are stepped down into nine or 6V ac with the assist of step downac transformer. Then those voltages are transformed into dc with the assist of bridge rectifier after which regulated into 5V dc with the assist of voltage regulator

3.1 Arduino Uno

The Arduino Uno is an open-supply microcontroller board based totally at the Microchip ATmega328P microcontroller. The board is ready with units of virtual and analog inputoutput (IO) pins which will be interfaced to diverse growth board (shields) and different circuits. The board has 14 virtual IO pins (six ready to PWM output), 6 analog IO pins, and is programmable with the Arduino IDE (Integrated Development Environment), through a form B USB cable. it should be powered through the USB cable or through an outdoor 9V battery aleven though it accepts voltages among 7 to twenty V. it's a bit like the Arduino Nano and Leonardo. Layout and manufacturing documents for some variations of the hardware are also available.1

3.2 Speed Sensor- IR Problematic Sensor

IR era is utilized in every day lifestyles and additionally in industries for specific purposes. For example, TVs use an IR sensor to recognize the indicators which can be transmitted from a far flung control. The foremost gain of IR sensor are low electricity usage, their easy layout and their handy features. IR indicators aren't great via way of means of human eye.

3.3 Temperature Sensor LM35

Lm35 is a precession Integrated circuit Temperature sensor, whose output voltage varies primarily based totally at the temperature round it. It is a small and reasonably-priced IC which may be degree temperature everywhere between -fifty five C to a hundred and fifty C. It can without difficulty be interfaced with any microcontroller that has ADC characteristic or any improvement platform like Arduino. Power the IC through making use of a regulated voltage like +5v (Vs) to the enter pin and linked the floor pin to the floor of the circuit. Now, you could degree the temperate in shape of voltage as proven below.

+Vs

(4v to 20v)

Output
0mV + 10.0 mV/ C

If the temperature is zero C, then the output voltage can also be 0V. There may be upward thrust of zero.01V (10mV) for each diploma Celsius upward thrust in temperature. The voltage can transformed into temperature the use of the underneath formulae.

Vout =10 mv/ C*T
Where,
Vout is the LM35 output voltage
T is the temperature in C

Pin Configuration:

Pin Number	Pin Name	Description
1	Vcc	Input voltage is +5V for typical application
2	Analog Out	There will be increase in 10mv for raise of every 1 C. Can range from55 C to 6V 150 C
3	Ground	Connected to ground of circuit

3.4 LCD: (16*2 Alphanumeric LCD display)

LCD modules are very commonly employed in most embedded projects, the explanation being its cheap price, availability and programmer friendly. Most people would have come upon these displays in our day to day life, either at PCO's or calculators. the looks and also the pinouts have already been visualized above now allow us to get a touch technical. 16*2 LCD is called so because: 16 Columns and a couple of Rows. There are lots of combinations available like 8*1, 8*2, 10*2, 16*1 etc but the foremost used one is that the 16*2 LCD. So it'll have (16*2=32) 32 characters in total and every character are going to be made from 5*8 pixel dots.

3.5 Wi-Fi Module

The ESP8266 can be a low-price Wi-Fi microchip, with a complete TCP/IP stack and microcontroller capability, produced through Espressif machine he chip first got here to the attention of western markers in august 2014 with the ESP-01module, made through a third-celebration producer Ai-Thinker. This small module lets in microcontrollers to connect to a Wi-Fi community and make easy TCP/IP connections the use of Hayes-fashion instructions. However, to begin with there has been nearly no - language documentation at the chip and additionally the instructions it accepted. The very low rate and additionally the incontrovertible truth that there were only some outside additives at the module

3.6 BLDC Motor

3.6.1 Construction of BLDC Motor

In this motor, the everlasting magnets connect to the rotor. The modern-wearing conductors or armature windings are positioned at the stator. They use electric commutation to transform electric electricity into mechanical electricity. The primary layout distinction among a brushed and brushless cars is the alternative of mechanical commutator with an electric powered transfer circuit. A BLDC Motor is a form of synchronous motor withinside the experience that the magnetic subject generated with the aid of using the stator and the rotor revolve on the identical frequency. Brushless motor does now no longer have any modern wearing commutators. The subject interior a brushless motor is switched via an amplifier that's prompted with the aid of using the commutating tool like an optical encoder. The format of a DC brushless motor can range relying on whether or not it's miles in "Out runner" fashion or "Inrunner" fashion.

• Outrunner – The subject magnet is a drum rotor which rotates across the stator. This fashion is desired for programs that require excessive torque and wherein excessive rpm isn't a requirement.

 • In runner – The stator is a set drum wherein the sphere magnet rotates. This motor is thought for generating much less torque than the out runner fashion, however is able to spinning at very excessive rpm.

3.6.2. Working Principle of Brushless DC motor

BLDC motor works at the precept just like that of a Brushed DC motor. The Lorentz pressure regulation which states that every time a contemporary wearing conductor located in a magnetic subject it reports a pressure. As a effect of response pressure, the magnet will revel in an identical and contrary pressure. In the BLDC motor, the contemporary wearing conductor is stationary and the everlasting magnet is moving. When the stator coils get a deliver from supply, it turns into electromagnet and begins offevolved generating the uniform subject withinside the air gap. Though the supply of deliver is DC, switching makes to generate an AC voltage waveform with trapezoidal shape. Due to the pressure of interplay among electromagnet stator and everlasting magnet rotor, the rotor maintains to rotate. With the switching of windings as High and Low signals, corresponding winding energized as North and South poles. The everlasting magnet rotor with North and South poles align with stator poles which reasons the motor to rotate.

IV.   APPLICATION

Brushless DC motors (BLDC) use for a extensive sort of utility necessities consisting of various hundreds, steady hundreds and positioning packages withinside the fields of business control, automotive, aviation, automation systems, care equipments etc.
- Computer difficult drives and DVD/CD players
- Electric vehicles, hybrid vehicles, and electric powered bicycles
- Industrial robots, CNC device tools, and simple pushed systems
- Washing machines, compressors and dryers
- Fans, pumps and blowers.

V. CONCLUSIONS

In this paper we proposed a new architecture for the control system that uses a flexible industrial-based Android smartphone that implemented by Ethernetshield and IBOARD Arduinois well used incaseof web domain for system control configuration..Owing to the measured results of controlled temperature to enhance the proper functioning of the device and to secure it from unwanted destruction like over heating due to increased temperature, the Ethernet shield connection is the support built acted over here,to normalize the working of the motor. Hence the Brushless Direct current motor speed is controlled successfully by using IOT with proper controlling phenomenon and here the parameters as well get monitored on a LCD display in case of expected output for the portable controlling applications.

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