

MONITOR AND CONTROL OF BLDC MOTOR PARAMETERS BY USING IOT

Dr.K.UMA DEVI¹, K.VEILAMMAL², V.GOKILAVANI³, S.KEERTHANA⁴

1 Professor/HOD of Electrical and Electronics Engineering

2, 3, 4, Students of Electrical and Electronics Engineering

Sengunthar Engineering College, Tiruchengode, Tamil Nadu, India

ABSTRACT:

Nowadays the BLDC motors are widely used in various industrial applications because of its properties such as high efficiency, reliability, high weight to torque ratio. In this paper presents the BLDC motor speed control and monitor the parameters such as voltage, current, speed, power is achieved by using internet of things. The internet of things is the emerging technology in this scenario, so it can be implemented in BLDC motor. The monitor and control of BLDC motor parameters are done in sensor less mode. In this sensor less mode the overall system cost is reduced in BLDC motor.

Keywords: BLDC motor, IOT, Sensorless.

INTRODUCTION:

The Internet of Things is the evergrowing technology of physical devices that feature an Internet Protocol (IP) address for internet connectivity and communication that occurs between these devices and other internet enabled devices and systems[1]. Among the various brushless dc motor Sensor less driving methods, the Back- EMF techniques are dominated owing to its simplicity and reliability[4]. However this method suffers from starting problem since there is no Back -EMF information at standstill. So, this problem can be overcome by introducing IOT based control. From this can able to adjust the speed as per requirements from initial to final value[3]. There are several methods are used for monitoring of parameters such as mathematical modelling, finite element method and optimization techniques. But these methods are time consuming and need more human effort[5]. Because of the newly introduced concept of internet of things (IOT) is providing a helping hand to achieve the industrial automation through remote access and also to monitor the parameters [2]. In IOT each device constituting a system will be able to communicate with the other devices or system in the same premises over a common platform.

OVERVIEW OF BLDC MOTOR:

Brushless dc motors are similar to ac synchronous motor. The major difference is that the synchronous motors develop sinusoidal back EMF, as compared to rectangular or trapezoidal back EMF for brushless dc motors. The basic construction of a BLDC motor consist of fan

blades attached to a permanent magnet rotor that surrounds the electromagnetic coils of the stator.

BLDC Motors



Fig1: BLDC Motor

EXISTING SYSTEM:

Basically there are two methods of speed control is possible for controlling BLDC motor. They are sensor control and sensor less control. To control the machine using sensors, the present position of the rotor is required to determine next commutation interval. In this method of control the various sensors are used such as hall sensor, positional sensors are used. By using this cost of the system is high because of sensors. And also the parameters monitoring is achieved by other optimization techniques. The parameter estimation technique refers to the process obtaining the parameters of the system to a specific input. Thus, in this process the knowledge of the mathematical model and its parameters are essential part. So, the existing system refers the speed control and parameters monitoring is achieved separately. Instead of this we have to implement these two processes in single circuit with IOT automation.

PROPOSED SYSTEM:

The proposed system consists of speed control of BLDC motor and parameter monitoring with IOT automation. This concept provides the remote access of BLDC motor for user requirement. From this we can able to adjust the speed and the parameters like temperature, power, voltage, current, speed were monitored for that corresponding speed. This paper presents the Arduino Uno with WIFI control automation of BLDC motor. In this system can adjust the speed whenever required. After monitoring of parameters the can reduce the speed and all parameters are comes to null position. The parameters are monitored by using

various sensors such as temperature sensor, current sensor, and proximity sensor. The proximity sensor of inductive type is used.

CIRCUIT DIAGRAM:

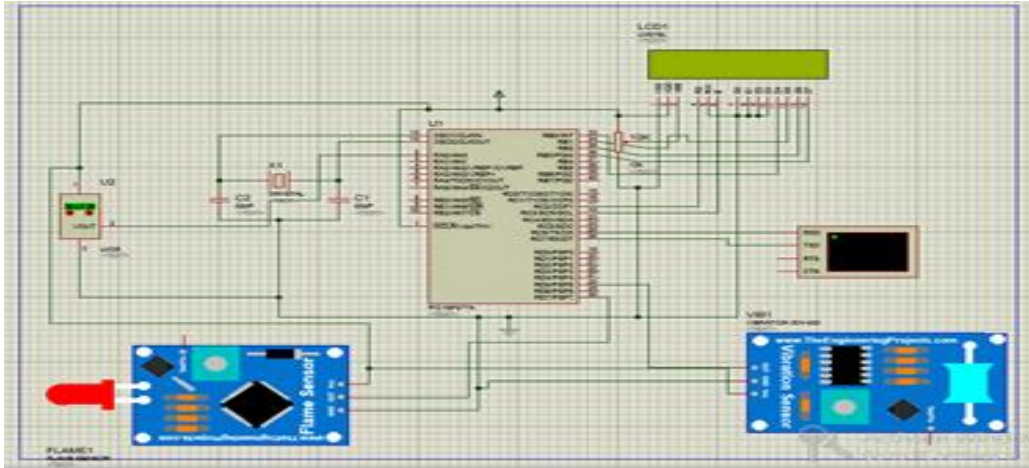


Fig2: circuit diagram of BLDC motor with IOT control

WORKING PRINCIPLE:

The BLDC motor working principle is normal trapezoidal Back-Emf motor but here we use sensor less operation. In this paper the back Emf can be detected by sensor less mode with IOT based control. This paper describes the monitor and control of BLDC motor parameters by using IOT. In this method the speed control can be achieved by online mode with WI-FI control. For this control purpose Arduino UnoWI-FI board is used. Whenever the speed control is required, this is able to control the speed anywhere in the place. After control of speed we can able to turn off the WIFI. There are various sensors are used for parameters monitoring such as temperature sensor , voltage sensor, current sensor and the proximity sensor is also used to detect the speed of the rotor. The proximity sensor of inductive type is used for rotor position detection. The speed is adjusted to desired value and the corresponding parameters are monitor through IOT automation technique.

PARAMETERS MONITORING USING PC:

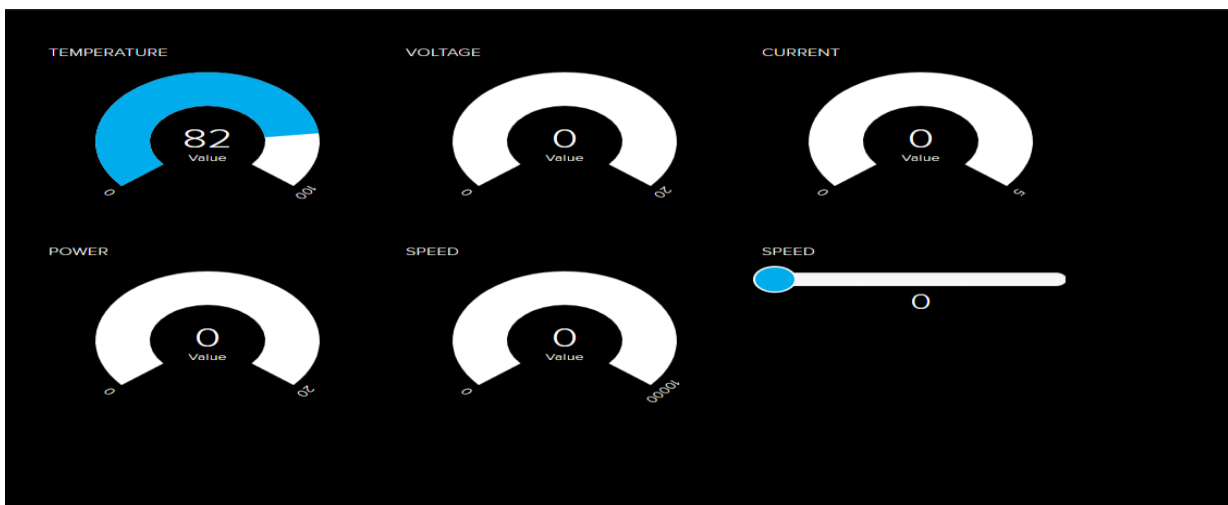


Fig3: Parameters monitoring

SIMULATION RESULTS:

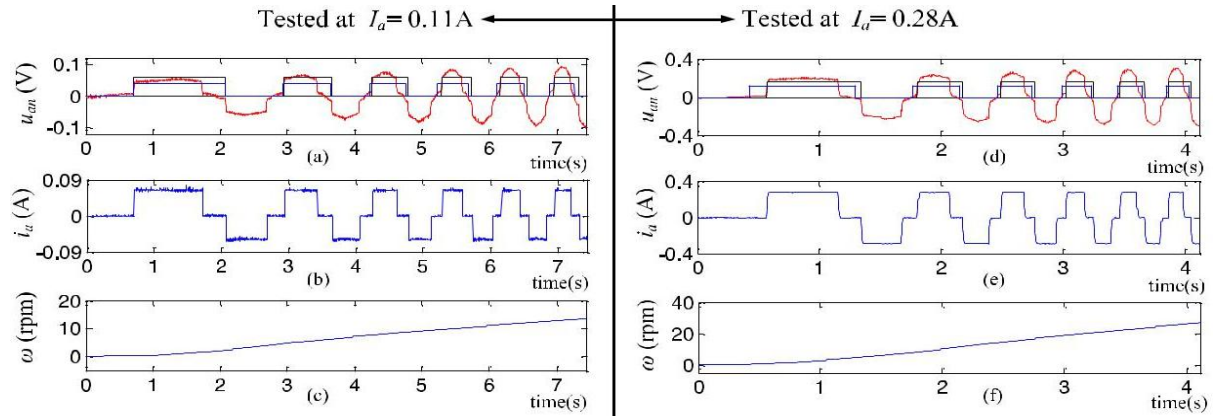


Fig4:Phase voltage, phase current and rotor speed waveforms during acceleration(a)phase voltage waveform(b)phase current waveform(c)rotor speed.

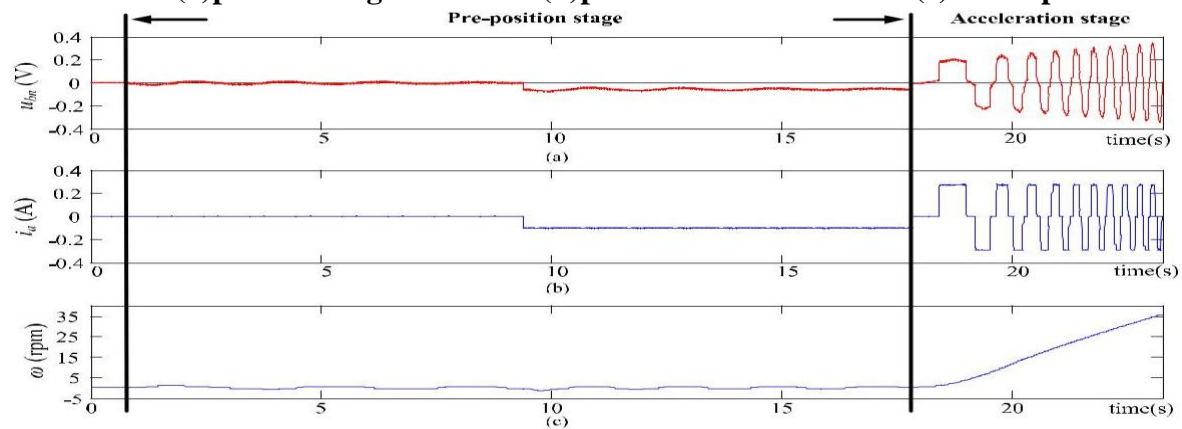


Fig5: Nonsalient sensor less motor startup process(A)Phase voltage waveform(B)Phase current waveform(c)Rotor speed

CONCLUSION

In this paper the architecture of sensor less BLDC motor speed control and parameters monitoring is achieved. This proposed architecture is used in a web services for communication between remote user and industrial device. The unique idea of the proposed work is to provide flexible and long distance connectivity between industrial environment and user.

REFERENCES:

- [1]. Ms. C. Hemalatha, Mr. R. Natarajan, P. Suresh , G. Ganesh Shankar ,“BRUSHLESS DC MOTOR CONTROLLED BY USING INTERNET OF THINGS”International Journal of Science Technology & Engineering ,Volume 3 ,Issue 09 ,March 2017ISSN (online): 2349-784X.
- [2]. K.Balamurugan, Dr.R.Mahalakshmi “MATHEMATICAL ANALYSIS OF BLDC MOTOR PARAMETER ESTIMATION USING IOT”, ISSN: 1748-0345 (Online).
- [3]. Lilantha Samaranyake, Mats Leksell, Sanath Alahakoon “REAL-TIME SPEED CONTROL OF A BRUSHLESS DC MOTOR VIA ETHERNET” articlein <https://www.researchgate.net/publication/242482914>

- [4]. Xinxu Zhou , *Member, IEEE*, Xi Chen , Cong Peng , and Yongping Zhou “HIGH PERFORMANCE NONSALIENT SENSORLESS BLDC MOTOR CONTROL STRATEGY FROM STANDSTILL TO HIGH SPEED”IEEE transactions on industrial informatics, vol. 14, no. 10, october 2018
- [5]. Uma Devi, K. and sanavullah, M.Y.,”MAGNETIC PARAMETERS AND TORQUE ANALYSIS OF EXTERIOR ROTOR PERMANENT MAGNET BLDC MOTOR BY FINITE ELEMENT METHOD”,European journal of scientific research, Vol. 71,2012,pp.561-568