International Journal of Education and Science Research Review
ISSN 2348-6457
Volume-2, Issue-2
April- 2015
www.ijesrr.org
Email- editor@ijesrr.org

Wireless Speed Synchronization of Motors in Industry

Aditya Sharma, Dhruva K. S. Rathore, Vidhi Verma
Department of Electronics and Communication Engineering
SRM University NCR Campus
Modinagar, Ghaziabad

ABSTRACT

The aim is synchronization of different engines utilizing remote innovation. This undertaking uses radio recurrence to synchronize engine speeds and is pertinent to numerous businesses like material factories, steel/paper plants wherein all the engines utilized on the transport are to be synchronized. Case in point, in material factories where numerous engines work all the while on a carpet lift to draw garments, it is fundamental that all the engines there ought to run at same pace, so that adjusted pressure is attained to maintain a strategic distance from garments gettingharmed. Here, engines are remotely synchronized to make the differential velocity mistake among various engines to zero. One engine goes about as transmitter then all different engines pace would be coordinated to the same velocity of the primary engine. The mode of correspondence is radio recurrence. Stepper engine is utilized to work on the premise of time delay control with every engine having a shut circle criticism system giving RPM. The above operation is done by utilizing one opto-isolator and a MOSFET and stepper engine properly interfaced from the microcontroller.

Keywords- DC, motor RF, speed, synchronization, wireless,

1. INTRODUCTION

This paper gives a framework that can be used to utilize DC motors for different applications**.** Beat width regulation (PWM) is a method of using exchanging gadgets to deliver the impact of a consistently fluctuating simple sign. [1].To create PWM signals we utilize PIC microcontroller which is a low control, superior CMOS 8 bit microcontroller with 8k bytes of in framework programmable glimmer memory. The dc motor utilized for the test is a 12volt, 300rpm stepper motor. One can utilize thesame method as a part of bigger engines too. Same change will be reflected in all the engines. The potentiometer control gives extensive variety of velocity control while push catches give more exact and precise control. A 220/12V stage down transformer is utilized to give data to the DC motor though a controller IC is utilized to give 5V force supply to the microcontroller.

2. CIRCUIT DIAGRAMS

The circuit diagram for the RF transmitter circuit is represented by fig 1 and the circuit diagram for the receiver circuit is represented by fig 2. The entire setup consists of a single transmitter circuit and multiple receiver circuits (considering three receiver circuits for the current configuration).

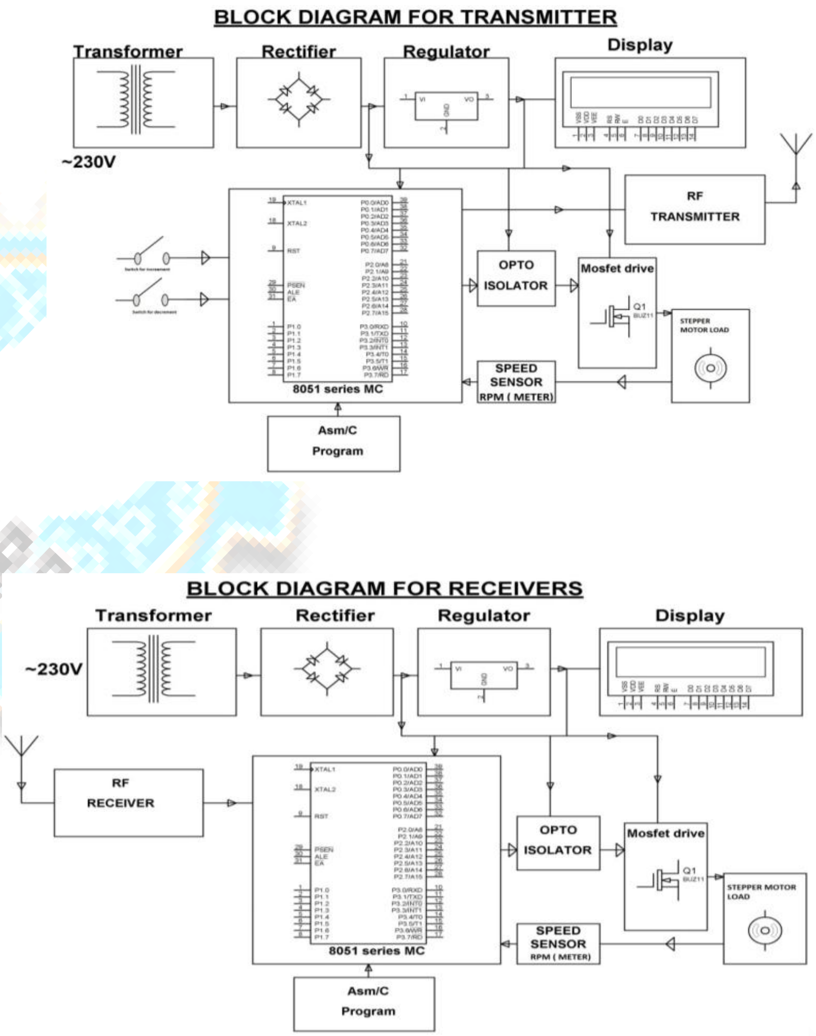

Figure 2

3. EXPERIMENTAL SETUP

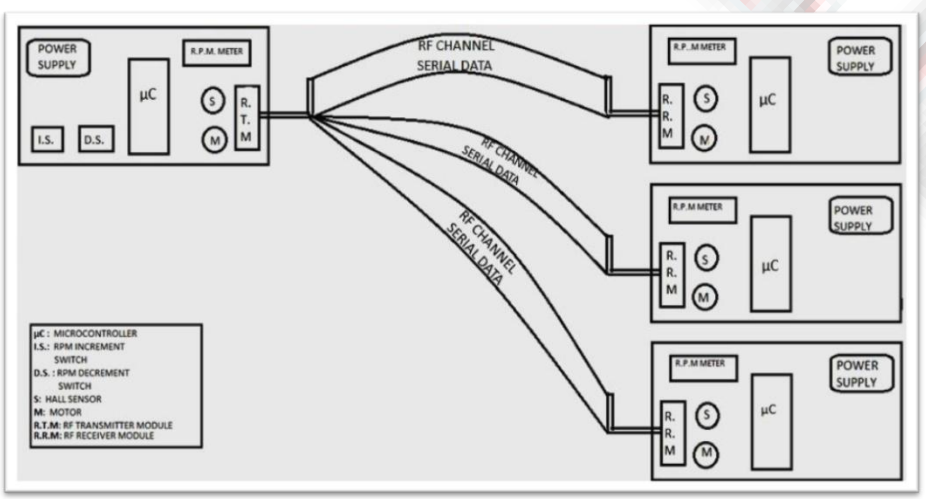

Figure3

The fig 3 illustrates wireless synchronization of motors. The transmitter circuit consists of a microcontroller which receives its input from two domains: first, increment and decrement switches and second, the rpm meter. The transmitting antenna RS232 operates at 433MHz.[2]

The receiving domain consists of three receivers, each with an effective aperture in the range of 433 MHz. The RPM of motors is deduced using hall sensors for every single motor.

The receivers are powered on using regulated power supply. The receiving end motors run at the max RPM by default, since these are not synchronized. Once the transmitter is powered on, the sensor provides RPM data to the microcontroller which then compares its value with the speed switch's output. The increment switch (I.S) increases the speed

by a predefined step whereas the decrement switch (D.S) decreases the same. The desired speed is then provided by the microcontroller at its output pin, which is then sent as an RF signal instruction to the receivers, in serial form. The receiver circuits then receive the data; compare the current speed with the instructed speed. If there is an increment detected, the microcontroller generates the signal for the same, instructing the motor driver to increase the delay between the codes. The delay causes the motor's RPM to decrease. This leads to synchronization of all the motors at either end of the RF channel [3].The speed of the motor can be controlled by the duty cycle of the square wave that is provided to the motor driver circuit.

Wireless synchronization makes use of KST-TX01 and KST-RX806 RF modules which is a 433 MHz serial data transmitter/receiver pair.[4] One PIC16F877A is programmed to transmit its ADdata (RA0/AN0 channel) serially using its built-in USART hardware at 1200 baud with no parity and 8-bit data stream. The PIC's USART transmitter (TX) pin feeds the data into the data pin of the KST-TX01 which transmits it using 433 MHz ASK RF signal. On the receiving end the KST-RX806 modulereceives the data and its output is connected to the another PIC's USART input pin. The second PIC is programmed to read its USART receiver (RX) pin.Since RS232 communications typically allow 8-bit data, the 8-bit A/D conversion is used here for simplicity, instead of the more common 10-bit ADC.

4. RESULT

The synchronization of motors was obtained successfully. TABLE 1 showcases the speeds (R.P.M) that were achieved with the current configuration :

Table 1

Tx motor R.P.M (experimental values)	Rx motor R.P.M (experimental values)
63	62/63
79	79
105	105/106
157	157
212	207/212
315	314/315

It is observed that the synchronized RPM's were accurate with very slight variations, which were nullified once the motor speed was stabilized. For higher RPM's the sensor first gives a pseudo measurement, which is then corrected for the actual RPM. The receiving end motors did not experience any significant delay in altering their speed.

5. CONCLUSION

It has been observed that the speeds of the three receiver motors are adjusted according to the speed of the transmitter motor. Thus wireless speed synchronization has been achieved and demonstrated successfully. This achievement can be further extended for applications such as providing uniform torques in textile machinery rotors. Improvements can be made in extending the range of the transmitter, currently 5-10m for the current scenario. Usage of BLDC motors for attaining advanced RPM can be implemented.

6. ACKNOWLEDGEMENT

The final year ECE B.Tech students as authors and their guide Mr. ManojVishnoi, are grateful to Mr. Pankaj Singh, Head of Department, Department of Electronics and Communication, SRM University, Modinagar for giving permission to utilize the laboratory facilities to carry out their research work. The authors are also grateful to Dr.(Prof) Manoj Kumar Pandey, Director, SRM University, Modinagar who always supports and encourages students to publish research papers.

REFERENCES

1. S. Wajiha, "Controlling Multiple Motors Utilizing a Single DSP Controller", IEEE Transactions On Power Electronics, Vol. 18. No.1, January 2003, Vol. 3, pp. 67-78.
2. H. Le-Huy, "A Synchronous Thyristorized DC Motor Drive", IEEE Transaction On Industry Application,2007,Vol. 6, pp. 23-25.
3. Muhammad H. Rashid, "Power Electronics", Prentice Hall International Inc., New Jersey, 1996, Vol. 7, pp.100-112.
4. S. Evon and R. Schiferl, "Direct motors: using an induction motor as an alternative to a motor with reducer",2009, Vol.34, pp. 378-39