

Usage of Fuzzy Rationale Utilizing Mems Accelerometer for controlling BLDC Engine Speed

Sankar Mahadevan¹, Taposh Mitra²

Department of Electrical Engineering, Dept of E&EE, BIT, Sindri, Bihar, India^{1,2}.



Abstract— A fuzzy logic controller (FLC) is an adaptable numerical structure that is equipped for recognizing complex nonlinear connections among info and yield informational indexes. Right now, the three-dimensional accelerometer sensor is utilized as info gadgets for the framework. The yield of this accelerometer sensor is simple in nature, to digitize these signs and to transmit over remote medium we are utilizing Arduino based ATmega8 microcontroller. ISM band RF modules are utilized to convey over the remote medium. The MSP430 is a blended sign microcontroller family from Texas Instruments. Worked around a 16-piece CPU, the MSP430 is intended for minimal effort and, explicitly, low force utilization inserted applications. This microcontroller is utilized at the collector end to get information and control the engine speed contingent upon the got information from the fuzzy logic.

Keywords— Fuzzy logic Arduino, MSP430, Accelerometer.

1. Introduction

Fuzzy logic is the theory of fleecy sets, sets that change irregularity. Soft basis relies upon the likelihood that all things yield to degrees. Temperature, stature, speed, partition, greatness – all proceeds a sliding scale. Various essential administration and basic reasoning endeavors are excessively unusual to ever be seen quantitatively, in any case, people win by using data that is questionable rather than careful. Cushioned set speculation looks like human intuition in its use of estimated information and weakness to create decisions. It was expressly expected to experimentally address helplessness and vagueness and give formalized instruments to dealing with the imprecision trademark for some structure and decision issues in an inexorably customary way. Speed control of BLDC motors has been one of the basic topics in mechatronics building. Starting from essential Cartesian robots to mammoth endeavors, for instance, steel was keeping up the motor speed of roller bars. Due to the non-linearity of BLDC motors, arranging a control system subject to structure recognizing evidence is inconvenient and all system parameters are inexact. Feathery basis controllers can be in every way that really matters executed using a couple of frameworks using a microcontroller where each fleecy rule is set by techniques for low-level figuring develop or fl chip that is configurable using going with programming ultimately using pc where guidance, generally, occurs in the progression methodology.

2. System Architecture

At this moment have two units, a transmitter unit, and the recipient unit. In the transmitter unit, we are using an accelerometer as data contraptions.

The yield of the accelerometer is straightforward in nature, to change over these basic signs into the propelled structure we are using in-manufactured six-channel ADC of Atmega8 little scale controller. By using the fleecy method of reasoning table, we are differentiating present data readings and starting at now watched pre-described info readings. For facilitated readings, we will transmit four propelled data bits through RF

transmitter.

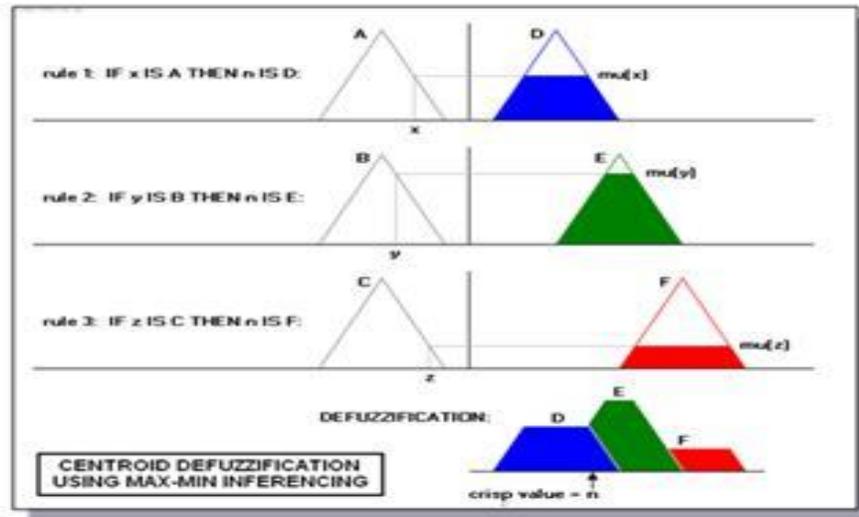


Fig. 1. Fuzzy logic levels

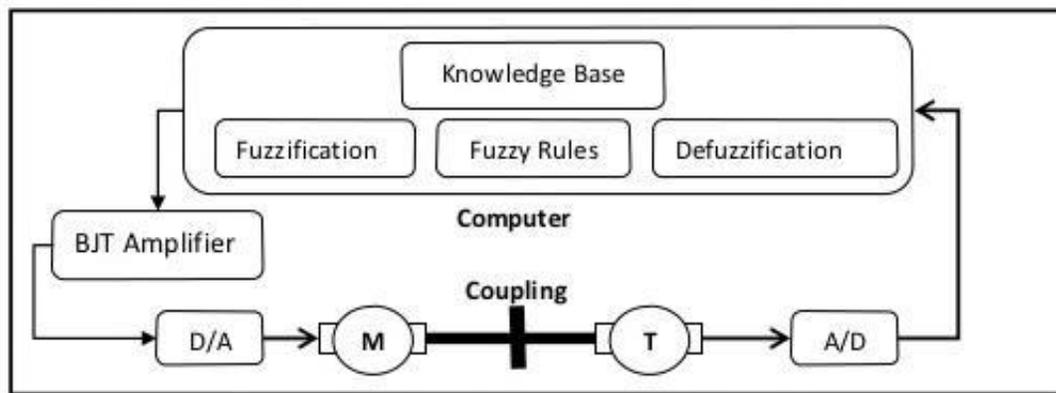


Fig.2. DC Motor speed control block diagram

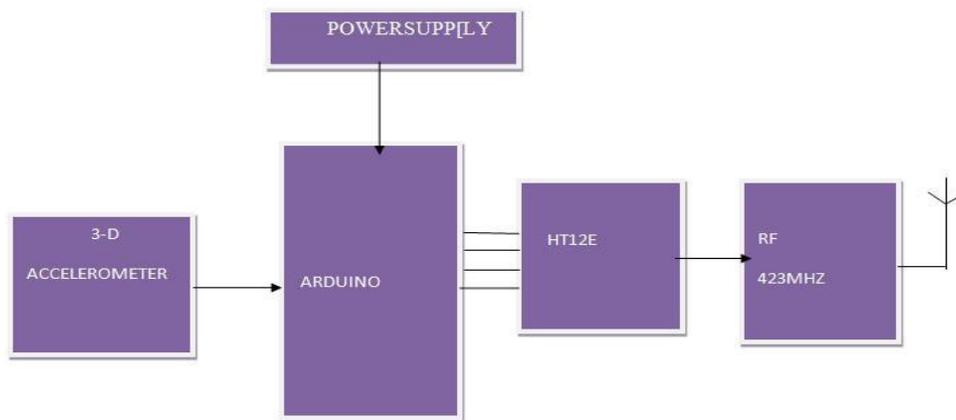


Fig.3. Transmitter unit

In the receiver unit RF receiver will receive four data bits from transmitter and depending on the received data bits motor speed will be controlled. For this purpose, we are using MSP430 controller. But micro controller cannot control motor directly in between it needs a driver circuit. L293D IC is used as driver circuitry.

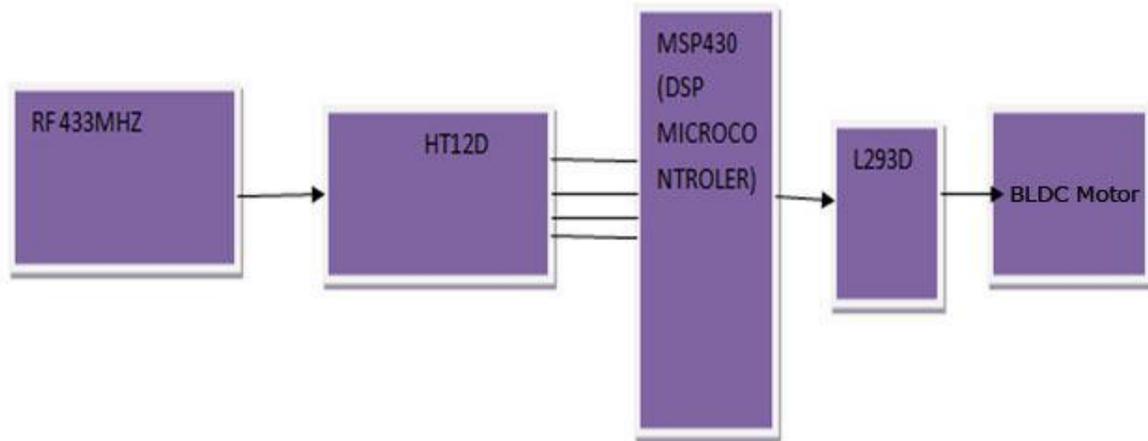


Fig.4. Receiver circuit

Fuzzy table:

X	Y	Z	RESULT	DUTY CYCLE
200-300	50-220	150-280	0011	0%
50-200	350-640	80-150	1001	25%
300-580	220-350	280-580	1010	50%
580-900	640-890	580-890	1011	75%
900-1020	890-1015	899-1010	1110	100%

3. Accelerometer Motion Recognition

Accelerometer sensor is utilized for motion acknowledgment. An accelerometer is a gadget that estimates the vibration or speeding up of movement and produces distinctive voltage levels. The power brought about by vibration or an adjustment moving (speeding up) causes the mass which delivers an electrical charge that is corresponding to the power applied upon it. Since the charge is relative to the power, and the mass is a consistent, at that point the charge is likewise corresponding to the speeding up.

Right now, are utilizing ADXL335 accelerometer, which is a 3-dimensional accelerometer. This board estimates speeding up in three measurements (X, Y and Z) and produces three distinctive voltage levels. The yield of the accelerometer is simple in nature, to change over these simple signs into computerized structure, we are utilizing in-fabricated ADC of Atmega8 microcontroller.

Here, Atmega8 microcontrollers consistently read information from the accelerometer and convert them into advanced structure. This digitized information are contrasted and the information which is as of now taken in the accelerometer investigation part. Also, for each development of accelerometer four information bits are allotted. Presently, in the examination stage digitized information is contrasted and the pre-characterized ranges, and for the coordinated range comparing information bits will be transmitted through ISM band RF transmitter.

4. Experimental Outcomes

We have effectively executed the undertaking tried for various obligation cycles with input gadget as an accelerometer and contact screen. At the point when the accelerometer is forward way obligation cycle is

100%, when it is the right way obligation cycle is 75%, when it is left way obligation cycle is half, and when it is back way obligation cycle is 25%. So also, when the select switch is LOW touch screen is chosen, when we contact in first quadrant engine runs with 100% obligation cycle, when we contact in second quadrant engine runs with 75% obligation cycle, when we contact in third quadrant engine runs with half obligation cycle, and when the fourth quadrant is squeezed engine runs with 25% obligation cycle.

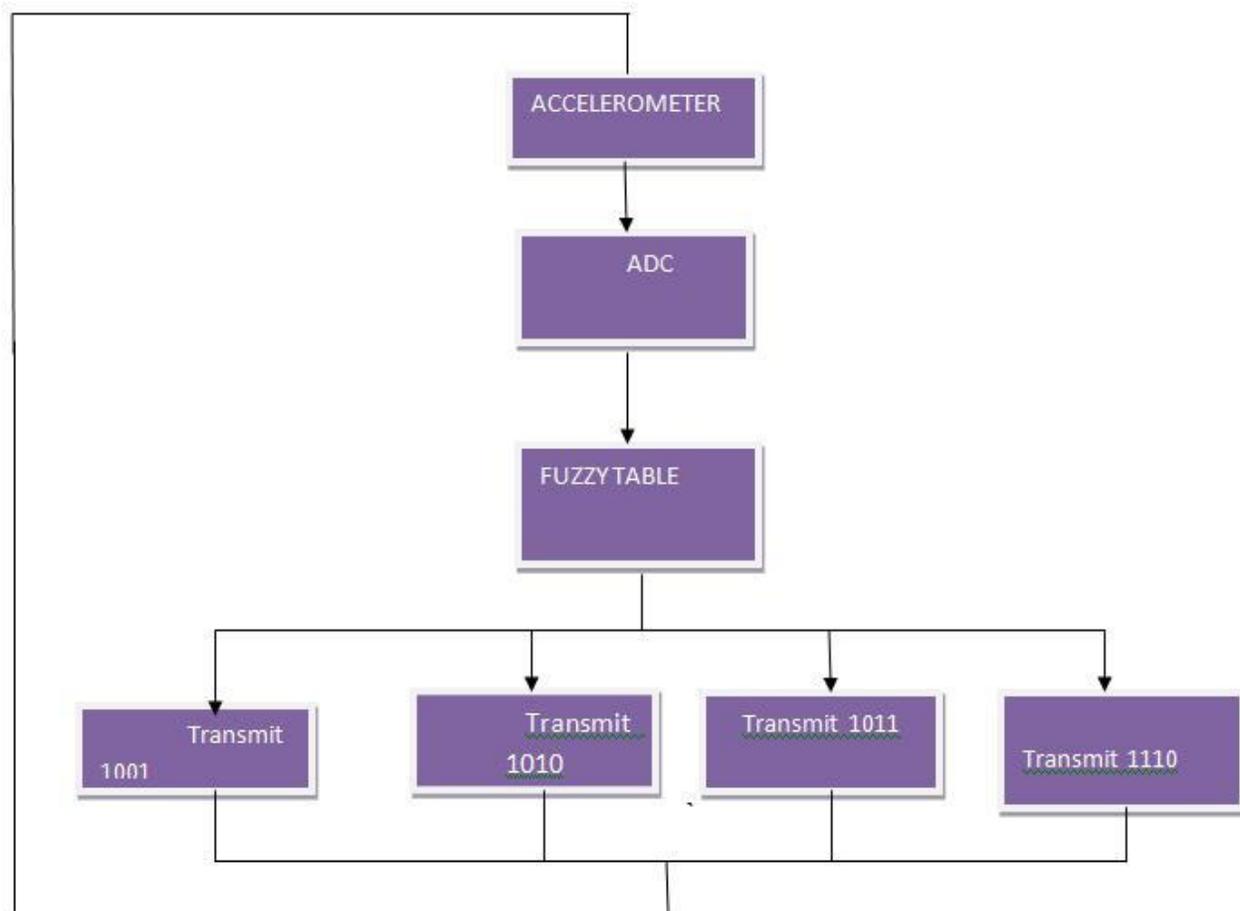


Fig.5. Flow chart for gesture recognition

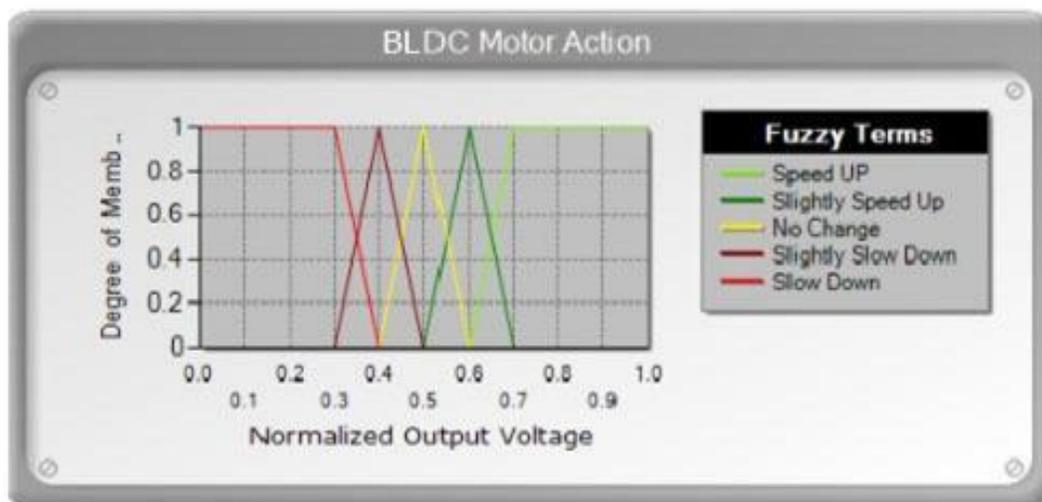


Fig.6. Motor Action

5. Conclusion and future scope

A fuzzy logic controller utilizing MEMS accelerometer has been actualized that gives superb execution as far as obligation cycle. The aftereffects of the investigation on the genuine plant show that the proposed fluffy rationale controller can affect ability to variety of the reference speed consideration. The aftereffects of the control are as per the following. The speed control of bldc engine demonstrated the proposed controller increases ideal execution. The proposed controller accomplished to conquer the impediment of the utilization of traditional control affect ability to idleness variety and affectability to the variety of the speed with the drive arrangement of bldc engine.

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