XVII INTERNATIONAL CONGRESS

MACHINES,

TECHNOLOGIES,

MATERIALS'20

3-PHASE MOTOR SPEED REGULATOR BASED ON MICROCONTROLLER AND INTELLIGENT POWER DRIVER CONTROLLER

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1. Introduction

In this paper, the main emphasis is on the work of the microcontroller and the driver's circuit, ie. power converter. The microcontroller generates a 3-phase SPWM signal that provides V/F operation of the motor [7]. In the paper, the power converter is realized in an integrated technique, so-called intelligent power module (IPM).

2. SPWM Microcontroller and Intelligent Power Module

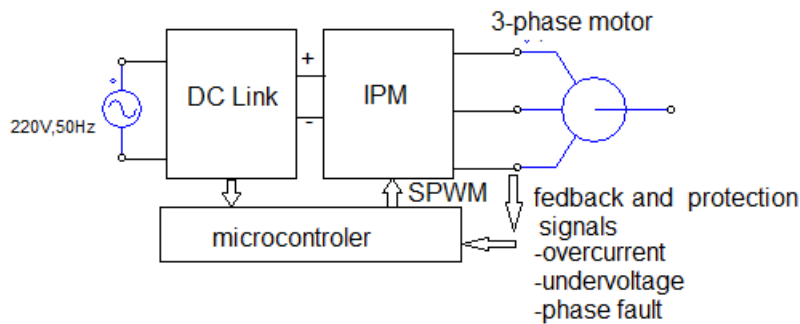In the Fig. 1 is shown a block diagram on 3-phase motor which is controlled by microcontroller.

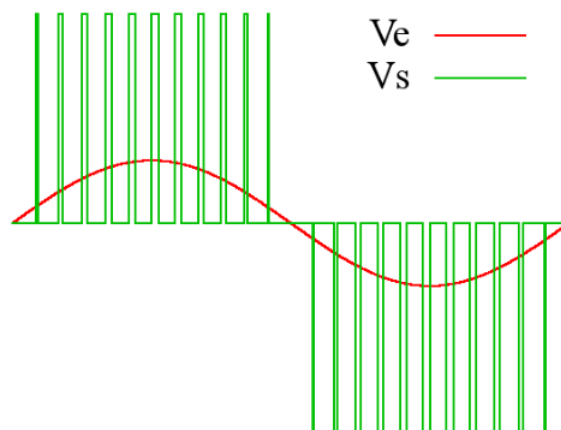*Fig. 1 Block diagram on 3-phase motor controlled by microcontroller.*
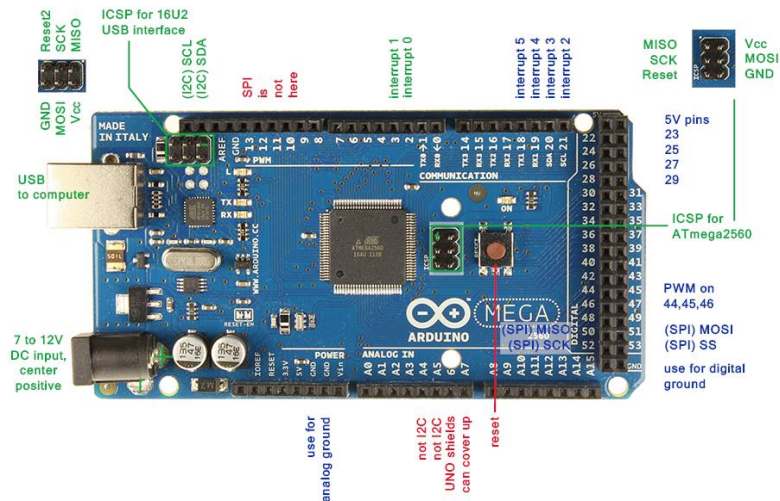

Fig. 2 Construction of SPWM signal.

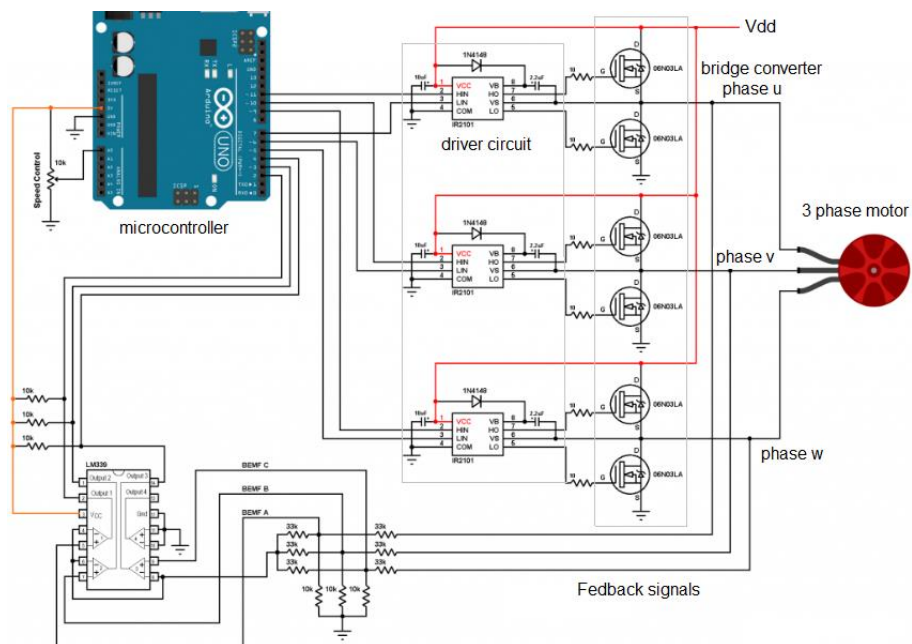*Fig.4 Microcontroller Atmega 2560 used in arduino mega board.*

Fig.6 Controller with discreet driver circuit and bridge converter.
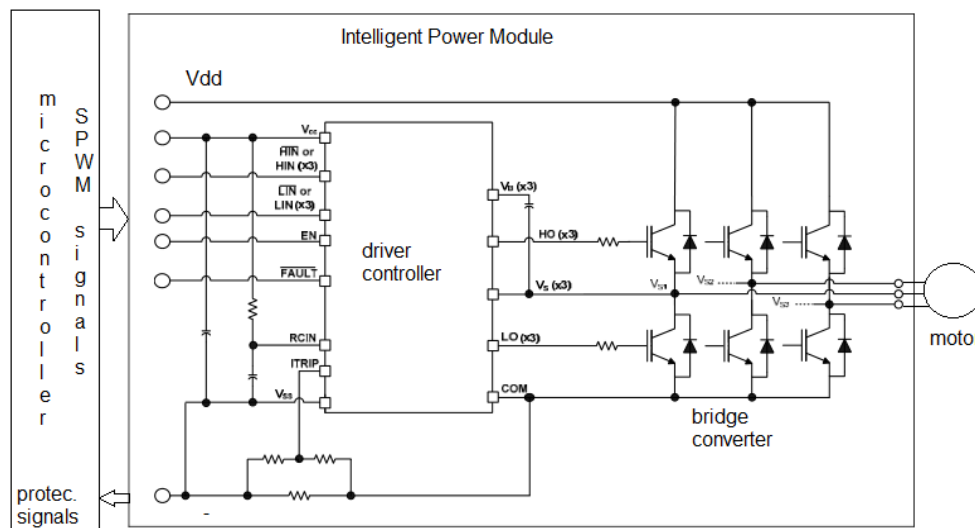
Fig.7 Motor controller controlled with microcontroller and intelligent power module.
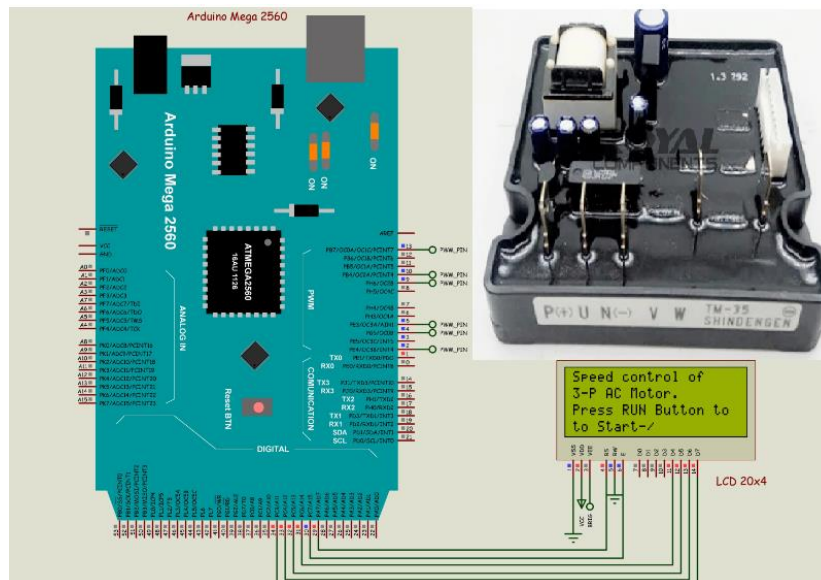

Fig. 10 Block diagram on speed motor regulator based of microcontroller Atmega 2560 and intelligent power module TM 35.
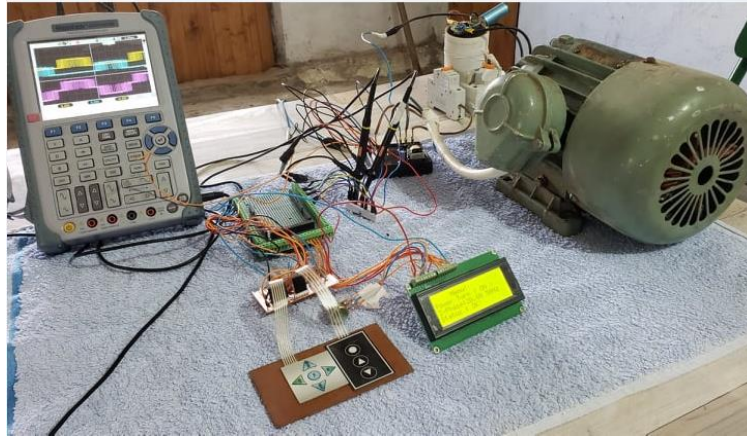
3. Experimental results

Fig. 11 Experimentally test the circuit of motor speed regulator
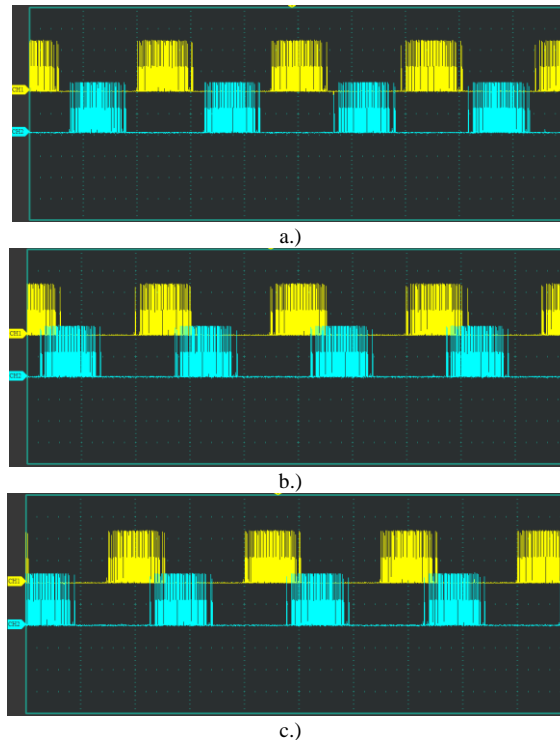

a.)

b.)

c.)

Fig. 12 Waveforms on theS PWM signals from the microcontroller: a.) PWM signals on phase u pin 4 (channel 1) and pin 13 (channel 2), b.) SPWM signals on phase u pin 4 (channel 1) and phase v pin 9 (channel 2), c.) SPWM signals on phase v pin 9 (channel 1) and phase w pin 2 (channel 2), Ch1 = 2 V/div, Ch2 = 2 V/div, time = 2 mS/div.
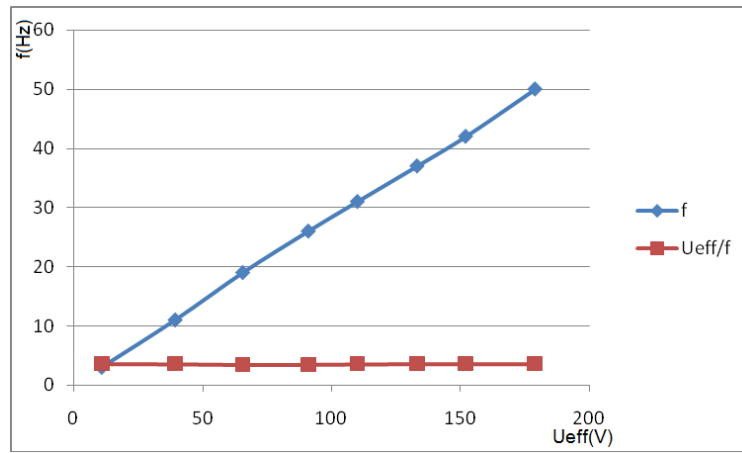
Fig. 15 Ratio of the effective value of the phase voltage of the motor and the motor frequency (U_{eff}/f) obtained by measuring on the developed prototype of the speed motor regulator.

5. Conclusion

In this paper is design and practically realized V/F speed regulator for 3-phase induction motor based on microcontroller. The specificity of the solution in the paper is the use of an intelligent power module for the power converter. Experimental results from the operation of the designed motor speed regulator show that it provides operation of the motor with a constant V/F ratio. This maintains the constant flux i.e. the moment of the motor.