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TO STUDY OF IOT BASED CONTROL AC& DC DRIVE WITH MONITORING SYSTEM

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ABSTRACT

In this paper, the IOT based control of DC footing engine has been accounted for. Web is the most generally utilized, fast and effectively available correspondence medium in the cutting edge world. The proposed framework permits any individual from any edge of the world to control substantial mechanical machines. The proposed framework is straightforward and profoundly successful regarding cost and effectiveness. In this framework, the exchanging and the speed of the DC engine can be constrained by utilizing a self-created android application. The PROTEUS reproduction affirmed the hypothetical evaluations of the exhibition of the proposed framework.

KEYWORDS: IOT, android application, Internet, Traction motors.

1. INTRODUCTION

Web was utilized in the prior occasions just for fundamental correspondence and data sharing. Nonetheless, the advancement of web has achieved a blast on the planet by the idea of Internet of Things [1]. Today the intensity of web is connected for doing numerous errands like controlling a remotely set server machine from anyplace in the globe. Bolstered by the web, came the idea of cell phones which have supported the equivalent by an incredible degree. Application explicit android applications have been created which perform undertakings and limit the human exertion by an extraordinary degree. Many minimal effort and adaptable observing frameworks have been created utilizing the idea of IOT worked together with remote methods of correspondence. IOT is characterized as a domain where objects (gadgets) are enabled one of a kind identifiers and to move information over a system without having human-to-human or human-to-PC communication [2]. A lot more thoughts have been explored and created. The Internet of Things is relied upon to assume a key job in a scope of areas, from production line computerization to human services [3]. Nonetheless, a noteworthy constraint of these thoughts is the way that their scope is restricted. The applications must be controlled inside a given situation and consequently, the physical nearness of the individual concerned is required somewhat [4]. Android cell phones anyway have beaten this impediment on account of its helpful nature and fantastic network. Android is an open source system and subsequently is generally prominent among the clients and cell phone producers [5]. The proposed framework enables the control individual to control the framework just by a tick on his PDA. On the other hand, PCs can likewise be utilized for the equivalent. The framework comprises of exceptionally straightforward and simple to utilize types of gear which can deal with assignments as large as controlling the footing of any apparatus utilizing the idea of Internet of Things (IOT). The framework will improve the productivity of ventures as it were. Additionally it will decrease the labor utilized generously bringing about an incredible spare in the organization's income as human asset is valuable. By utilizing this innovation, simplicity of working together can be accomplished. For instance, in atomic reactors, after the chain response begins, one can't go inside framework. Constant checking of the framework is exceptionally vital since even a little shortcoming or some sort of spillage can influence individuals and can cover enormous territory. So to watch out for everything occurring inside an atomic reactor, required electronic gadgets can be introduced at first and later they can be checked utilizing IOT. These gadgets can be connected to numerous PCs making an entire control room and even to advanced mobile phones with the goal that crisis cases can likewise be taken care of. For traffic the executives framework, a little electronic gadget is introduced in the vehicles including speed sensors. At the point when a vehicle crosses as far as possible, the vehicle information is consequently sent to the police control room and a challan is produced naturally which they need to pay or their permit will be

dropped. So as to secure any vehicle, little electronic lock is fixed inside the motor. In the event that an individual finds that his/her vehicle has been taken, they themselves can bolt the motor with the assistance of their advanced mobile phones and the hoodlum is never again ready to control the vehicle since the lock is embedded inside the motor and is hard to open it in such circumstances.

2. PROPOSED TECHNIQUE

The point is to control substantial mechanical machines utilizing an android cell phone from anyplace on the planet. An android application can be created utilizing virtual products like Android studio. The created android application can control and screen the heap with its client configurable front end. It will contain a rundown of the considerable number of spots wherein the machines are found. The particular choice will connect to the page where a gadget will contain various qualities for speed control. When the incentive for the speed is fixed, the information is sent from the application to an online web server. This activity can be completed by the expert in-control. The android application and the Wi-Fi-module are connected to an online cloud server which will store the required speed preset by the administrator. The comparing control information from the online web server will be gotten by the Wi-Fi module. The Wi-Fi module gives web to the ARDUINO UNO microcontroller or a programmable rationale controller (PLC) in instances of modern drive control. The W4fi-Fi module transmits the control information to the ARDUINO microcontroller. The microcontroller then gets the information from the module. Relating beat width balanced heartbeats are created from the microcontroller PWM pins. These heartbeats are bolstered to the engine driver. The engine driver IC can be effectively controlled from the microcontroller as it works in the request for 5V to 36V. The engine driver thus drives the engine as indicated by the beats sustained to it. The android application will likewise help in observing the running status of the machine. The framework enables the administrator to check the control and speed parameters of the machines. The Fig.1, 2 speaks to the fundamental square outline of the proposed framework wherein a man can work different industrial facility hardware just by a tick of his cell phone application.

the processor manufacturers. In addition, the energy measurements of each phase were made using the "FFT-Based Algorithm for Metering Applications" library developed by Freescale Semiconductor Inc. The reference voltage input on the IoT-IMM-H was taken on a transformer, using a single reference for the R, S, and T phases. The difference of 120 ° between the R, S, and T phases was equalized by the software. A single voltage reference was used to reduce cost. However, the currents belonging to each phase were taken separately. The sensitivity required for predictive maintenance was not needed since the difference between the phases was minimal.

In AC energy measurement, true power (P), measured power (W), apparent power (S), measured voltage (VA) and reactive power (Q) are calculated. Complex and real components are shown trigonometrically in Equations 1 and 2, and a depiction of energy calculation is given in Figure 10a. The "FFT-Based Algorithm for Metering Applications" is explained in detail in the AN4255 application note and will not be described further in this study. The embedded software performed Vrms and Irms energy calculations separately for each phase. The embedded software performed 3750 samplings for this process, at an average of 25 samplings per alternation (Fig. 10b). The root mean square (RMS) was used to determine the effective value of the AC signals. As a result, with its high processing power, the LPC1769 was easily able to perform the energy calculations for the three phases.

$$I_{RMS} = \sqrt{\sum_{k=0}^{\frac{N}{2}-1} (I_{RE}^2(k) + I_{IM}^2(k))}$$

$$U_{RMS} = \sqrt{\sum_{k=1}^{\frac{N}{2}-1} (U_{RE}^2(k) + U_{IM}^2(k))}$$

(1)(2)

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where *IRE(k), URE(k)* are real parts and *IIM(k),UIM(k)* imaginary parts of *k.*

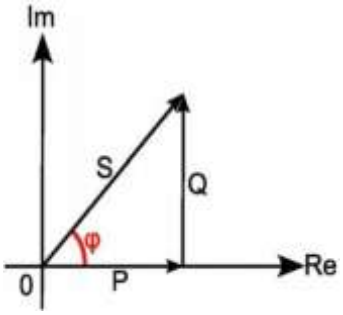

Fig. 10a. Energy calculation triangle: apparent power (S), true power (P), reactive power (Q) and CosFi

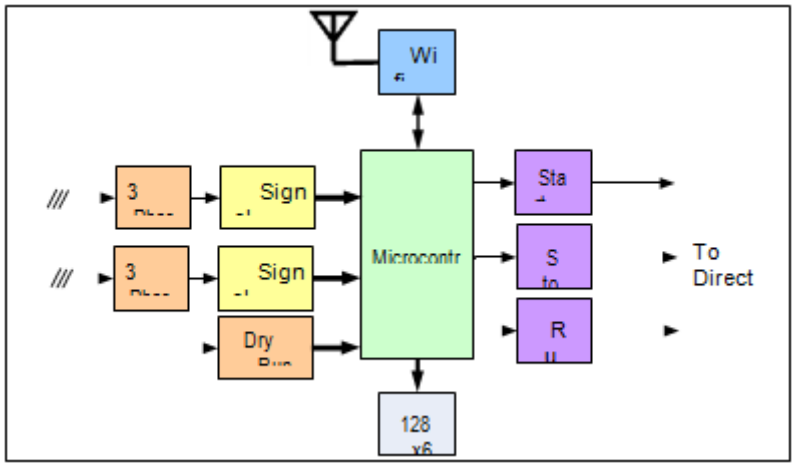

Fig.1.Block diagram representation

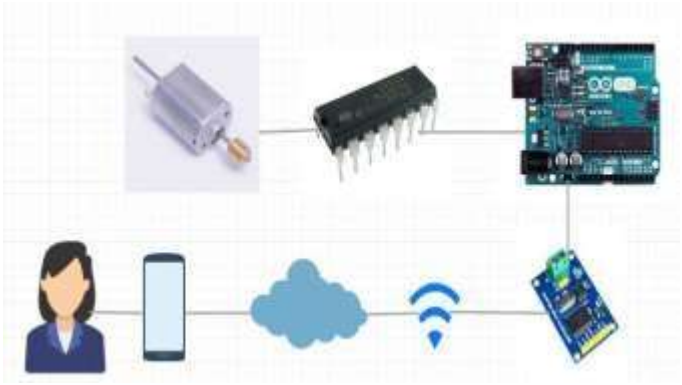

Fig.2. Diagrammatic representation

3. ANDROID APPLICATION

The android application is created utilizing an open source stage like android studio. The application in this way created will have choices for both the administrator and the control individual. The application would give a two-way control. The principal method of control can be where the controller can choose the machine whose parameter is to be controlled. When this is done, the present movement will be connected to the following

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action which will contain various qualities for the speed control. When the choice is made, approval token will approve the client utilizing a predefined secret phrase in the application. When the secret phrase matches with the predefined secret word, the web on the telephone sends the control information to the cloud web server. Be that as it may, as opposed to the ordinary cloud-driven design, virtual assets for the Internet of Things, a product engineering to determine the pressure between powerful improvement and proficient activity of IoT applications has likewise risen [6]. Presently in the main method of control, an administrator can be physically present at the machine area and can download the required machine running parameters from the web server now and again and consequently, he can work the machine likewise. In the second proposed technique, the running parameters of the machine will be gotten by the microcontroller and through the code transferred in the microcontroller, it will send expected guidelines to the engine driver through exchanging exhibit and the machine will keep running at the given parameters.

The CMS software reads by scanning the IoT-IMM- H modules and the other sensory data calculated by the IoT-IMM-H with UDP protocol. The UDP protocol is ideal for such sensor readings because handshaking is not necessary. If there are new packet losses, or if some of the IoT-IMMH modules are closed, the TCP/IP stack software does not waste extra processing power. The CMS software reads the data about the motor for about three seconds and then sends a UDP broadcast packet to all IoT-IMM-H modules. They receive this packet and send a data packet in response. Because the CMS software is written as "event driving", there is no packet loss, even if all IoT-IMM-H modules have the same data. The data packets from the IoT-IMM-H modules are immediately added to the pool of data packets. According to the data in the pool, a CMS thread updates the database with other predictive maintenance and energy data.

4. SMARTPHONE

There are nearly 3 billion smartphone users of which nearly 82 % use android. Out of the total available devices, 2.4 billion are IoT compatible [7]. The developed android application will be installed on the smartphone. The smartphone will use its internet connectivity to send over the control data to the web cloud servers such as firebase or one out of the many database platforms that are available. The android application will be user-friendly and easily accessible by all android smartphone users.

5. MICROCONTROLLER

The arduino UNO microcontroller accompanies the ATmega328P microcontroller inserted. ARDUINO UNO is intended to give numerous offices to speaking with the PCs, an another ARDUINO and other on-board controllers [8]. The standard working voltage for the board is 5V. In any case, the prescribed info voltage ranges from 7V to 12V. It contains 14 computerized input/yield pins, out of which 6 are beat width balance empowered pins. There are 6 simple info pins present on the board. It bolsters a blaze memory of 32 KB of

which 0.5 KB is utilized by the boot loader. The clock speed is 16MHz. The SRAM and EEPROM are 2 KB and 1 KB individually. Additionally the microcontroller has extraordinarily helpful measuring wherein its length and width are 68.6 mm and 53.4 mm individually [9]. The arduino microcontroller will be stacked with a program composed on arduino C. The program will manage the microcontroller to download the control information from the online cloud web server. The information will be gotten utilizing the Wi-Fi module at customary interims. This information will be in type of simple qualities 0-255. In like manner the microcontroller can be utilized to balance the pins of the engine driver IC to cause the engine to work in various modes like forward motoring, forward braking, switch motoring, turn around braking. Additionally the particular simple qualities got speak to speeds where 0 speaks to 0 speed and 255 speaks to full speed. Fig.3 demonstrates the arduino UNO microcontroller.

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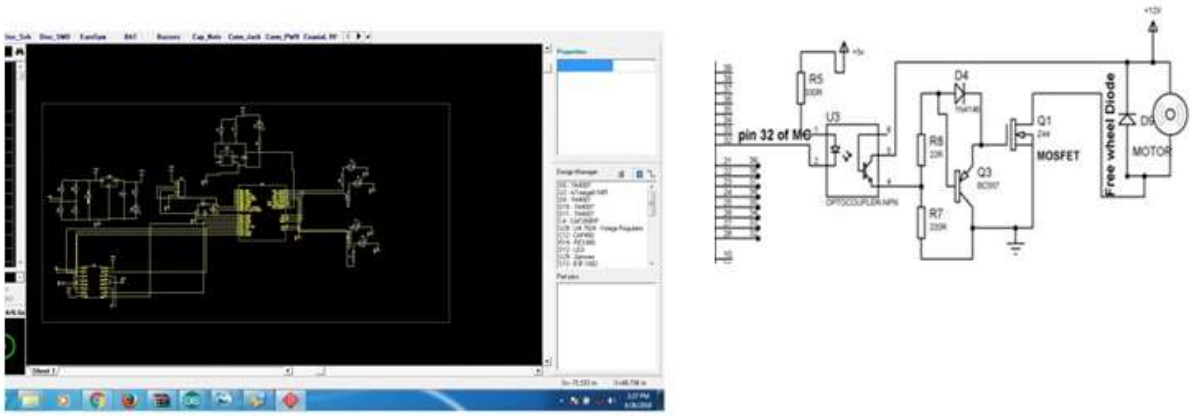

Fig.3. Diagrammatic representation

6. WI-FI MODULE

There are a number of ways in which the Arduino microcontroller can be connected with the internet. One way is using the Arduino UNO Wi-Fi board [10]. It has been represented in Fig 5. It is a microcontroller board with Wi-Fi module embedded in it. Another way is to use a separate ESP8266 Wi-Fi module. It has integrated TCP/IP protocol stack. It comes pre-programmed with AT command set firmware. It has 1MB Flash memory. It is IEEE 802.11 b/g/n Wi-Fi. It has 16 GPOI pins. It supports SPI as well as I2C communication protocols [11]. Predefined library is also available for coding. The fig.4 shows a ESP8266 Wi-Fi module.

Fig.4. ESP8266 Wi-Fi module

Fig.5. Arduino UNO Wi-Fi board

7. MOTOR DRIVER

In the simulations for the prototype, the motor driver integrated circuit L293D has been used. The L293D is a dual H-bridge motor driver IC. The Fig. 6 represents the IC. This IC is controlled using the arduino microcontroller and it serves as the final step for the proposed system. Using the motor driver IC, the motor can be made to operate in all the four quadrants. It has an output current of 600 mA and a peak output current of 1.2 A per channel. Output diodes are also included in the IC for protection against any back EMF produced by the motor. The output supply has a wide range from 4.5 V to 36 V [12].

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Fig.6. L293D motor driver

Metal-Oxide Semiconductor Field-Effect Transistor (MOSFET) The metal-oxide semiconductor field-effect transistor (MOSFET) is actually a four-terminal device. In addition to the drain, gate and source, there is a substrate, or body, contact. Generally, for practical applications, the substrate is connected to the source terminal. If this is the case (and it usually is), the MOSFET may be considered a standard three-terminal device, with the drain, gate and source the terminals of interest. Like all FET structures, the MOSFET uses the field effect to operate – the attraction or repulsion of charge carriers through an applied voltage – but this device has a twist that has allowed it to become the predominant technology for silicon based FETs. The MOSFET structure has dominated primarily due to the availability of a high quality oxide (SiO2, or silicon dioxide) for the silicon system. As we will see, this oxide acts as an insulator and provides electrical isolation between the gate and an active (conduction) channel between the source and drain, thus providing the required input/output isolation.

8. SIMULATION RESULTS

The reenactment of the framework is straightforward. Above all else, the libraries of Bluetooth and Atmega-328 should be downloaded in light of the fact that these libraries are not predefined in proteus. These libraries are effectively accessible on the web. The following stage includes extraction of records from the zip organizer that has been downloaded and incorporating them in the library area present in the proteus envelope (present in the introduced drive). Rest everything is accessible in the product. On composing the catchphrase or the codes, the rundown shows up in the part list.

To send the sign from Bluetooth, virtual terminal from the instruments area present in extraordinary left corner of the screen in the state of waveforms directly underneath the tests ought to be chosen. On running the reproduction, a virtual terminal shows up. On entering the required codes in the terminal, the engine moves in like manner. Execution of the circuit is consequently tried and relating helped PWM sign is found in the virtual oscilloscope. The waveform appeared underneath in the virtual oscilloscope is the yield PWM beat from the driver circuit. The Fig.7 speaks to the reenactment circuit chart as attracted proteus. Fig. 8 speaks to the waveforms got during the forward motoring method of activity. Fig. 9 demonstrates the virtual terminal diagram of the equivalent. Fig. 10 demonstrates the reenactment results when a more slow speed is connected instructed.

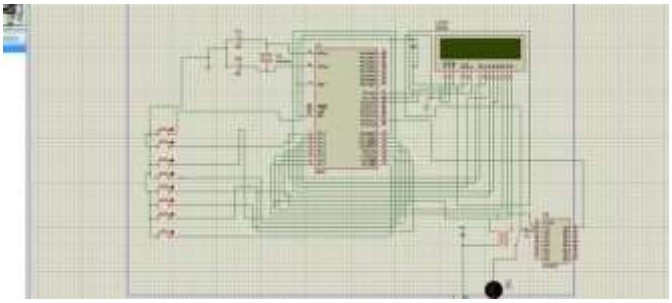

Fig.7.1. Proteus schematic of the circuit diagram

9. EXPERIMENTAL STUDY

The system is being tested in a factory in Bursa, the textile center of Turkey. There are 18 looms in the factory working in the range of 2.7 kW - 4.5 kW. The maintenance schedule of the motors has been determined and the energy consumed per product calculated. The data indicate that better linear results are obtained when the stator winding temperature of the motor is included in the model.

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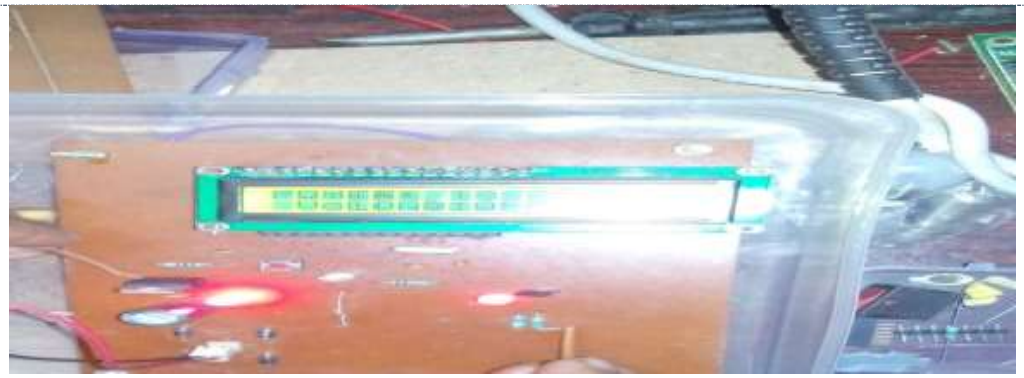


Fig. 7.2 Experimental Result testing

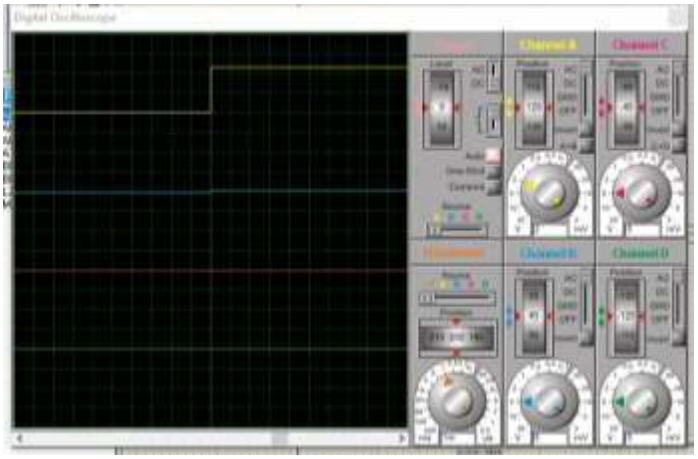


Fig.9. Virtual terminal at different modes of operation

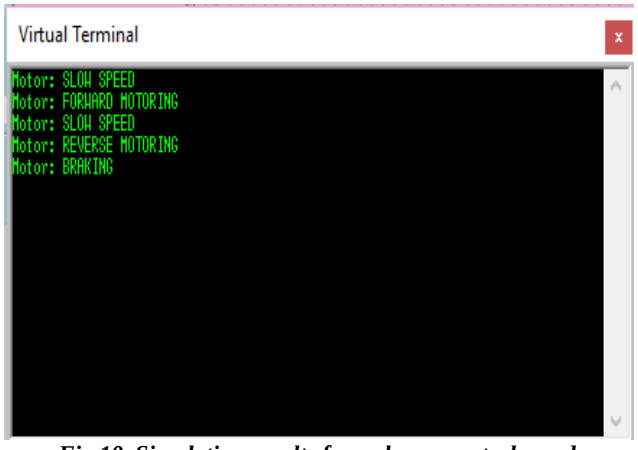
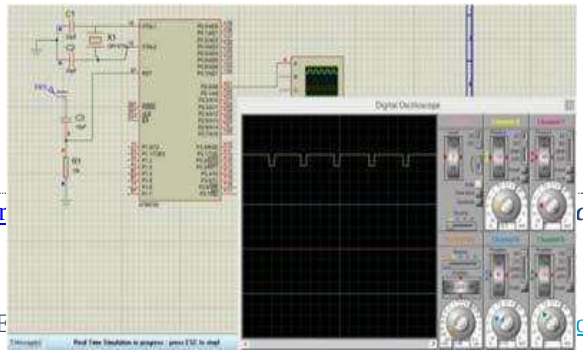


Fig.10. Simulation results for a slower control speed



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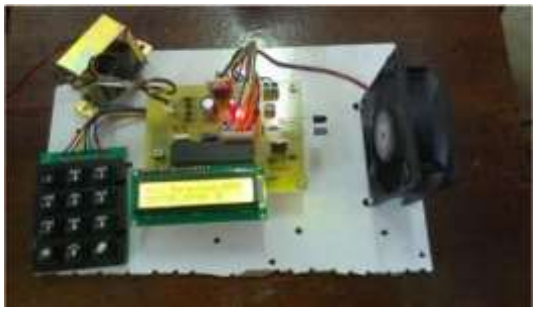
Practical Implemented Result



10. CONCLUSION

The system developed in this study has yielded successful results for production environments where there is little variation in the load on the motors. This learning method can be used for motor power ratings, especially for 7/24 machines. This study has provided statistics not only for creating mathematical models but also for enabling the CMS operator to establish a motor maintenance schedule.

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