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Microcontroller Based Automated Voltage Pulse Tester

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ABSTRACT

This paper surveys on controller-based automated voltage pulse tester which is employed to scale back error and increase the efficiency in providing the right voltage to the system. This technique reads the input voltage and consistent with output, it will adjust automatically. It'll provide the right voltage to the system. The aim is to convert the manual process into automated. Automation is the creation of technology and its application in order to control and monitor the production and delivery of various goods and services. It performs tasks that were previously performed by humans. Automation is being used in a number of areas such as manufacturing, transport, utilities, defense, facilities, operations and lately, information technology.

Keyword-voltage pulse tester, voltage controller, variable pulse width for programming, high voltage measurement.

I. INTRODUCTION

In electronics component manufacturing industries various types of components are manufacturing like a resistor, capacitor, inductor, relay, etc. In this component testing, a very high voltage is required. This high voltage adjustment is done manually. Due to this manual adjustment of variac, it will generate the error. We have to reduce this error convert manually process into automated. It takes the voltage automatically and according to the pulse value, it will set the voltage. Because of that, we have to increase the accuracy of the system is high.

II. OVERVIEW

Now today's various electronics industries used the manual operation for the voltage adjustment. Because of the manual operation it can generate the error in the system. To reduce this error we are designating a system which can adjust voltage automatically according to the input value or pulse. We are designing a system which will continuously observe the input voltage and according to the input value it will change the voltage of the system. This system will used to reduce to human interaction and increase the efficiency of the system.

III. PROPOSED SYSTEM

At the input side scanner is place to scan the value of the resistor according to the input value controller adjust the variac position. Here AT-mega 328 is used as a controller. Arduino software is used to upload the programming code into the controller. The lookup table of the input value and the variac voltage will be added in the code so controller can compare the input value with the feedback. Feedback system consist of analog to digital voltage controller in the range of 0-5V and controller compare it with the input and accordingly adjust the position of the variac ultimately it will adjust the voltage of the system.

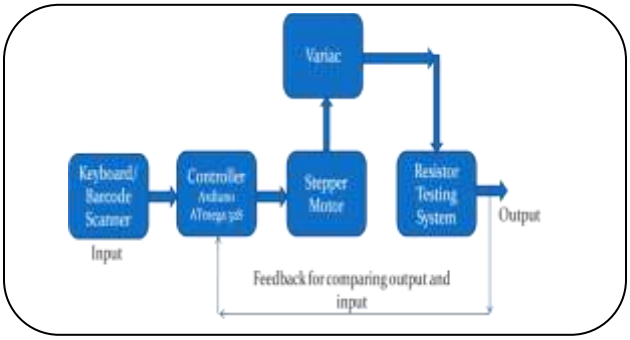

Figure: - Block diagram

A microcontroller-based automated pulse voltage tester. In the resistors manufacturing process, a very high dc voltage is applied across the resistor to test the resistors. But now this process exits in an industry that required human interaction, so our task is to convert this manual process into automated. The hardware of the project consists of ATmega 328 microcontroller, stepper motor, ADC, keypad. The keypad is used to provide the input pulse value to the controller. Stepper motor is used to adjust the position of the variac. ADC is used for the feedback loop. Atmega 328 is a high performance, low power controller from Microchip. ATMEGA328P is an 8-bit microcontroller supported AVR RISC architecture. it's the foremost popular of all AVR controllers because it is employed in ARDUINO boards.

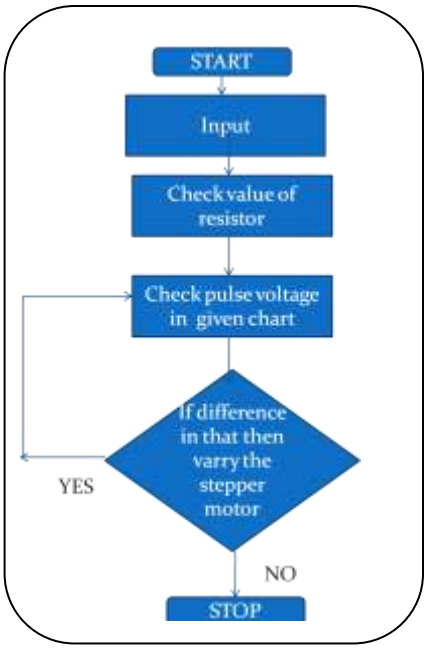

Figure: - Flow Chart

1) Barcode scanner is the input device. it is used to scan the value of the resistor and give this as a input to the microcontroller.ATmega328 is used as a microcontroller.
2) Micro-controller takes the input from the scanner and then compares it with lookup table which is already loaded into the microcontroller. Then sends the appropriate command to the stepper motor.
3) Stepper motor takes the input from the controller as per the signal of the controller stepper motor changes its angle. Stepper motor is attached to the variac shaft which issue to change the voltage.
4) Input voltage range of the variac is 0-230v and outputis0-2000v this high output voltage is used as a input for the resistor tasting system.
5) Analog to digital voltage converter is used at output side of the variac. It will attenuate this high range output voltage in the range
of 0-5v. This ADC is for feedback to the controller
6) Controller compare this feedback ADC voltage with the input signal and accordingly sends the signal to the stepper motor.

IV. SOFTWARE SPECIFICATION

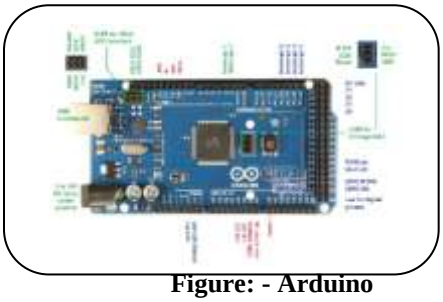

Figure: - Arduino

Arduino is an open-source prototyping platform used for building electronics projects. It consists of both a physical programmable circuit board and a software, or IDE (Integrated Development Environment) that runs on your computer, where you can write and upload the computer code to the physical board. The Arduino board started adapting to the new needs and challenges, differentiating it from simple 8-bit boards to products for IoT applications, wearable, 3D printing, and embedded environments. Arduino can interact with buttons, LEDs, motors, speakers, GPS units, cameras, the web, and even your smart-phone or your TV.

- Microcontroller: ATmega328
- Operating Voltage: 5V
- Input Voltage (recommended): 7-12V
- Input Voltage (limit) : 6-20V
- Digital I/O Pins: 54 (of which 15 provide PWM output)
- Analog Input Pins: 16
- DC Current per I/O Pin: 20 mA
- DC Current for 3.3V Pin: 50 mA+
- Flash Memory: 256 KB of which 8 KB used by boot loader
- SRAM: 8 KB
- EEPROM: 4 KB
- Clock Speed: 16 MHz
- Length: 101.52 mm
- Width : 53.3 mm
- Weight: 37 g

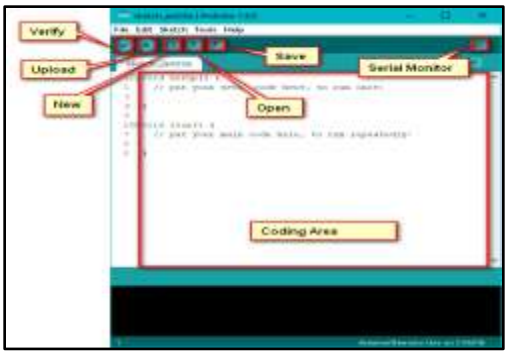

Figure: Software Window

V. HARDWARE SPECIFICATION

1. Barcode Scanner

Figure:-Barcode Scanner

A Barcode scanner is an optical scanner which will read printed barcodes, decode the info contained within the barcode and send the info to a computer. Sort of a flatbed scanner, it consists of a light-weight

source, a lens and a light-weight sensor translating for optical impulses into electrical signals. Additionally, nearly all barcode readers contain decoder circuitry which will analyze the barcode's image data provided by the sensor and sending the barcode's content to the scanner's output port.

2. Stepper Motor

Figure: - Stepper Motor

A stepper motor is a mechanical device it converts electric power into mechanical power. Also, it's a brushless, synchronous motor that will divide a full rotation into an expansive number of steps. The motor's position is often controlled accurately with a none feedback mechanism, as long because the motor is carefully sized to the appliance. Stepper motors are almost like switched reluctance motors. The stepper motor uses the idea of operation for magnets to form the motor shaft turn a particular distance when a pulse of electricity is provided. The stator has eight poles, and therefore the rotor has six poles. The rotor would require 24 pulses of electricity to maneuver the 24 steps to form one complete revolution. Differently to mention this is often that the rotor will move precisely 15° for every pulse of electricity that the motor receives.

Operation of Stepper Motor: Stepper motors operate differently from DC brush motors, which rotate when voltage is applied to their terminals. Stepper motors, on the opposite hand, effectively have multiple toothed electromagnets arranged around a central gear-shaped piece of iron. The electromagnets are energized by an external negative feedback circuit, for instance a microcontroller.

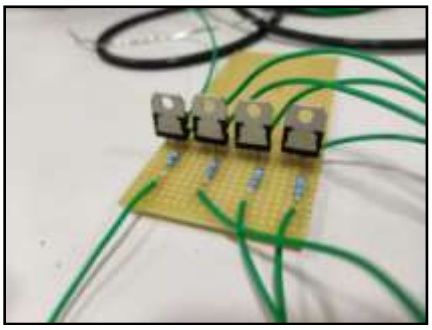

Figure-Stepper Motor Driver Circuit

To make the motor shaft turn, first one electromagnet is given power, which makes the gear's teeth magnetically interested in the electromagnet's teeth. The purpose when the gear's teeth are thus aligned to the primary electromagnet, they're slightly offset from subsequent electromagnet. So when subsequent electromagnet is turned ON and therefore the first is turned OFF, the gear rotates slightly to align with subsequent one and from there the method is repeated. Each of these slight rotations is named a step, with an integer number of steps making a full rotation. Therein way, the motor are often turned by a particular. Stepper motor doesn't rotate continuously, they rotate in steps. There are 4 coils with a 90o angle between one another fixed on the stator. The stepper motor connections are determined by the way the coils are interconnected. During a stepper motor, the coils aren't connected together. The motor features a 90o rotation step with the coils being energized during a cyclic order, determining the shaft rotation direction. The working of this motor is shown by operating the switch. The coils are activated serial in 1 sec intervals. The shaft rotates 90o whenever subsequent coil is activated. Its low-speed torque will vary directly with current.

3. Transistor

Figure -Transistor (TIP120)

The TIP120 is an NPN Darlington Power Transistor. It can switch loads up to 60V with a peak current of 8A and an endless current of 5A. This makes it suitable for medium and high power electronics like controlling motors, solenoids, or high power LEDs. The transistor during which one p-type material is placed between two n-type materials is understood as an NPN transistor. ... In NPN transistors, the direction of movement of an electron is from the emitter to the collector region thanks to which the present constitutes within the transistor.
The fundamental principle behind all transistors is simple: Current flow between two terminals is prevented by an energy barrier that has been found out between them. to work the transistor, a 3rd terminal is as long as it allows you to lower the energy barrier. A transistor works when the electrons and therefore the holes start moving across the 2 junctions between the n-type and p-type silicon. ... By turning a little input current into an outsized output current, the transistor acts as an amplifier. But it also acts as a switch at an equivalent time.

VI. CONCLUSION

The work is aimed at developing an automated pulse voltage tester which will adjust the position of the variac ultimately it controlled the voltage automatically. Input voltage pulse is fluctuates continuously so by using this automated voltage pulse tester it will adjust voltage of the system according to the input fluctuating pulse value.

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