Innovative Journal for Opportunities and Development in Science & Technology,
Volume 4, Issue 2, March. 2024
Paper Id: – IJ2023V4I2 -5 A-E
ISSN 2582-6026

POWER CONTROL BY INTEGRAL CYCLE SWITCHING WITHOUT GENERATING HARMONICS

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ABSTRACT - we are using a comparator for zero crossing detection which is fed as an interrupt to the microcontroller of 8051 family. Here, the microcontroller delivers the output based on the interrupt received as the source from which triggering pulses are generated.In order to provide integral cycle control in accordance with the input switches interfaced to the microcontroller, we use these pulses to drive the opto-isolators, which in turn trigger the TRIAC.

To validate the output, a series motor or lamp can be utilised instead of a linear load to be employed in the outp ut.An imbalance in the input current or voltage waveform as the cycles are turned on and off is one consequence of using this approach. off across the load. A lamp is provided in this project in place of a motor for demonstration purpose. The project output with a lamp appears to be a simple project of lamp flickering but the real objective is to verify in a CRO/DSO ,whether at the random switching also the load switches on at zero cross of the waveform or not.

I. INTRODUCTION

Singlphase induction motor speed regulation is accomplished using ac phasecontrolled switching, which results in significant high-order harmonics.

An integral cycle control approach is also an option, but it introduces subharmonics into the line and only allow s for step-by-step adjustment of the output voltage.

A discontinuous phasecontrolled switching technique is suggested as a way to lessen these circumstances.Phase control and integral-cycle switching are used in tandem to control voltage.

The former method controls the fine voltage, while the latter method controls the step voltage.

Rotor fantype loads: when this method is used to regulate the main winding voltage alone, the suggested control ler performs better. When loads have a constant torque, conventional voltage controllers including ac regulators offer a very limited speed control range. The strong sub-harmonics of the controlled voltage due to integral-cycle controller is used for such loads.The rotor is forced to lock at any desired sub-synchronous speed. Different types of motors operate smoothly over a wide range for fan-type loads and near various sub-synchronous speed at aerated conditions for constant- torque loads.

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II. METHODOLOGY

A pulsing DC signal is produced when an AC signal is applied to the bridge rectifier circuit.The optocoupler rec eives this output.Only when electricity is detected does the opto-coupler start to conduct.
Thus, the microcontroller receives this input when the zero cross over voltage is detected.
When the power is high, we activate the chip.The desired value is now being used to trigger the TRIAC.
Additionally, MOC 3021 chip is linked to the TRIAC gate because microcontroller cannot directly handle more voltage from AC to DC communication device. So, after the opto-coupler receives the desired value it will fire the gate, according to the angle and the TRIAC will be allowed to rotate the motor. Four switches are required to read the input values and four connections are made as shown in the code of microcontroller . Resistor is connected for switch concept, because it has to shift from low to high positions. The bulb is being connected to the power supply and the code from the ARDUINO is uploaded

III. BLOCK DIAGRAM

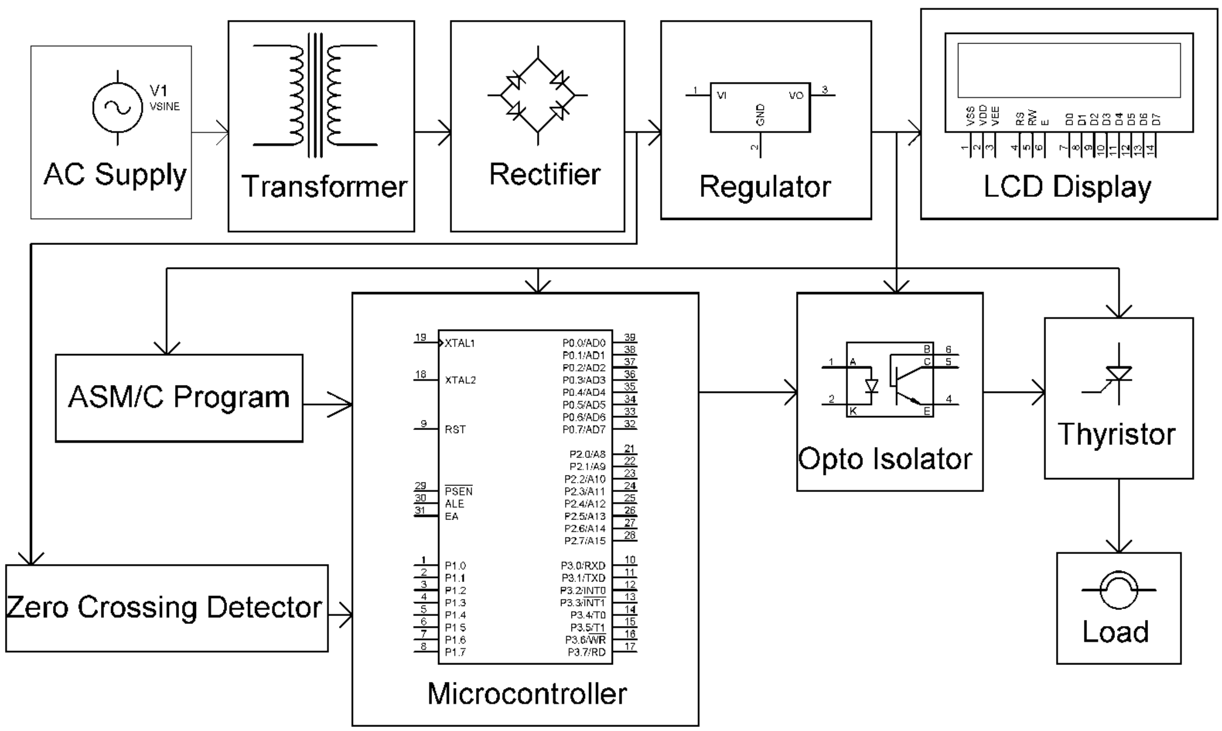

Fig.1 -Block Diagram for the contactless train

IV. HARDWARE IMPLEMENTATION

MICRO-CONTROLLER UNIT: The heart of the whole project is the Micro-controller unit. For this project the ESP32 Micro-controller was used. It is a low power general purpose micro-controller with good processing speed, small physical dimension, that is durable and cheap.it having in built wifi and Bluetooth.

In above diagram as we see that the all the components is communicate with the esp32 microcontroller it is the heart of our system and hence the all the devices input and output is attached with the controller . We use ir sensor for detecting any faults in railway track..the overall system communicate with the controller which sense the input coming from the sensor and send this output to the relay . *coils uses for power supply which passes.*

2) LCD DISPLAY: this is 16*2 display which shows the process output like ,humidity in air ,temperature and other parameter like water pump is ON or OFF.

*3) ZERO CROSSING DETECTOR :*A comparator is used for zero crossing detection, fed to microcontroller as an interrupt. Microcontroller thus produces output as per interrupt received and generates triggering pulses. These pulses can then drive opto-isolators in triggering the TRIAC

4) THE POWER SUPPLY UNIT: The power supply consists of a step-down transformer 230/12V, which steps down the voltage to 12V AC

*5) 5v relay:*it is using for the switching purpose to turn on the water pump.

V. CONCLUSIONS

Integral cycle switching gives us power control.We know how to take the cycle out of the primary input.We rec eive output that is distortion-free.

By regulating the power and offering zero cross switching, this model also lowers the harmonic content and the risk of sparking.The induction motor's speed can also be managed using this configuration.The simulation inve stigation of AC voltage management control technique exploitation LT SPICE is also covered in this work.In te rms of proportion THD, it is determined that ICC is significantly more cost-effective than PCS.

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