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Prevention of the Aeroponic System by the Voltage and the Current Sensor

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Abstract: ***The concept of electronic circuit breaker came into focus realizing that conventional circuit breakers such as MCBs take longer time to trip. Therefore, for sensitive loads it is very important to activate the tripping mechanism at the shortest possible time, preferably instantaneously. This project is demonstrates fast tripping mechanism as against the slow one like MCB. Electronic circuit breaker is based on the voltage drop across a series element proportional to the load current, typically a low value resistor. This voltage is sensed and rectified to DC which is and then compared with a pre-set voltage by a level comparator to generate an output that drives a relay through a MOSFET to trip the load. The unit is extremely fast and overcomes the drawback of the thermal type. It uses a microcontroller from 8051 family.***

Keywords: Electronic Circuit Breaker, Voltage and current sensor, PIC, WIFI module.

1. Introduction

The term Aeroponics is derived from the Greek meanings of *aer*- "air" and *ponos* "labour".The basic principle behind the aeroponics system is growing of the plants in the closed or semi-closed environment by .The nutrient-rich water solution is sprayed into the plants dangling root and to the lower stem the environment is prevented from the pests and disease so the plants can grow in the healthier and faster way the diagram for the aeroponics system is shown below

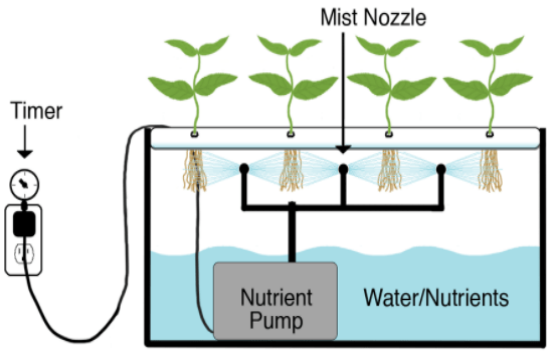

Figure 1: Aeroponics system

The types of the aeroponics system are the

- Low pressure units
- High pressure devices
- Commercial systems
- Contemporary aeroponics
- Aeroponic bio-pharming

In plants grown in aeroponics systems spend 99.98% spend their time in air remaining 0.02% will be in direct contact with hydro-atomized nutrient solution. Unlike like other systems plants grown in the aeroponics system is not constantly surrounded by the some medium where for example the plants grown in the hydroponics systems is completely immersed in the water the diagram for the hydroponics system is shown

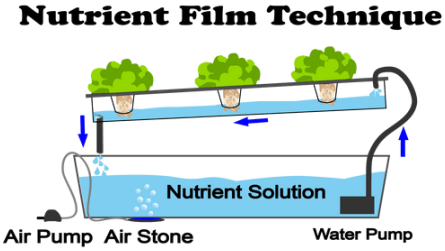

Figure 2: Hdroponics system

The main disadvantage of the hydroponics system is the usage of the water in aeroponic system the usage of water is very much reduced. Unlike like other systems aeroponics is cost effective why because the lower usage of the water to the plants and fewer nutrients are required at any time compared to the other systems. In aeroponics system the spreading of the pathogens from the one plant to the other plant is protected and by using the aeroponics system infection of the seed stocks by the pathogens can also be minimized

Figure 3: Growing of the potato in aeroponics system

The first plant grown in the aeroponic system is the Solanum tuberosum (potato). This technique is used because to reduce the production cost and to improve the health care and the quality of the potatoes form the previous generation. where for the aeroponics system the large number of electrical components are used the main aim of this is to prevent the entire system using the voltage and the current sensor.

2. Electronic Circuit Breaker

The main of our project is to design the ECB switch unlike like other conventional switches where currently the

Miniature Circuit Breaker (MCB) is used this type of the switch is the thermal type these type of the switches are not much more efficient because there is no faster switching between the voltage and the current terminals so the devices under the system may get damaged where by using of these switches for that purpose the ECB is introduced rather than the thermal type the ECB works with the help of the Micro controller this gives the faster switching and the networks can be achieved the block diagram clearly explains the ECB.

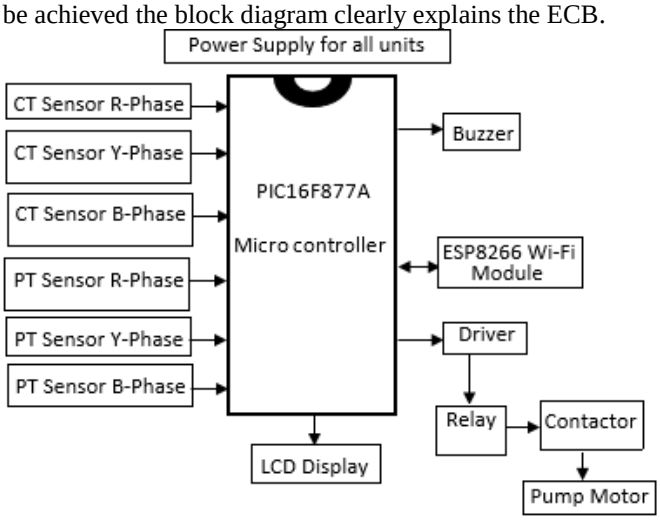

Figure 4: Block diagram of the ECB

In this paper the PIC Microcontroller is used where PIC has the many types in this project the PIC16F877A is used it is derived from Harvard architecture microcontrollers made by Microchip Technology it is the extension of the PIC1640 where the PIC is Programmable Interface Controller.

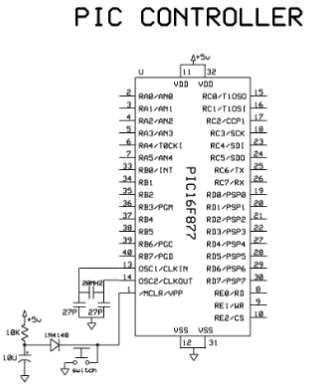

Figure 5:PIC16F877A

Because of the low cost, larger availability and free development tools and the capability of serial programming PICs are popular in the Industry sectors and hobby sits. The PIC instruction set vary from the 35 to 80 the lower end starts form the 35 instructions and the higher end contains the 80 instructions the instruction include the variety of the operations starting from the registers, accumulators, and literal constant, conditional execution and program branching PIC is also having the skip instructions which is used for the conditional execution and branching the skip instructions in PIC are the 'skip if bit set' ,'skip if bit not set' although the PIC microcontroller has the many advantage PIC has the several limits like it has only one accumulator, small instruction set, operators and registers are not orthogonal are the some of the limits of the PIC microcontroller does not have any affect in this project. where all the electronic devices work in the Direct Current (DC) where giving of the direct DC power supply is not possible so the Alternating power supply (AC) is given it is converted by using the Full wave rectifier by using the Transformer the 240 voltage Alternating current is stepped down and is converted to the 5 and 12 voltage Direct Current.

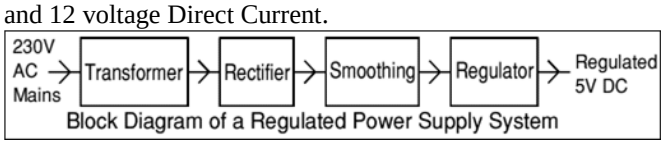

Figure 6: Linear Direct current

Adjustable linear power supply are available in the market where we can adjust the output voltage the wider range for example the circuit designers set the bench power supply adjustable upto 30 voltage and the current upto the 5 amperes where the transformer is used to convert the voltage from one to another where with the little loss of power.

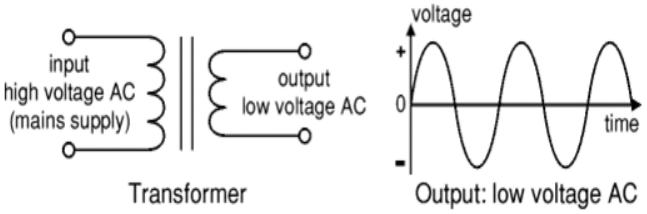

Figure 7: Transfromer and output graph

Relays are used to cutoff the voltage and current basically relay is an electromagnetic switch which is used to switch on and off the circuits where the relay is very use if we use the lower voltage circuit basically the relay components consists of the electromagnetic coil, iron, insulator, support, high or low voltage switch contacts where the driver using IC ULN 2003 is a high voltage and high current Darlington transistor arrays where the ULN 2003 is monolithic, The Darlington arrays consists of the 16-pin dual in-line plastic packages (suffix "A") and 16-lead surface-mountable SOICs (suffix"L"). To facilitate the ease layout of the circuit the devices are pinned with the inout and the output layout All the devices are set over the operating voltage of about -20°C to +85°C. Most of the devices are also set to operate at the -40°C.

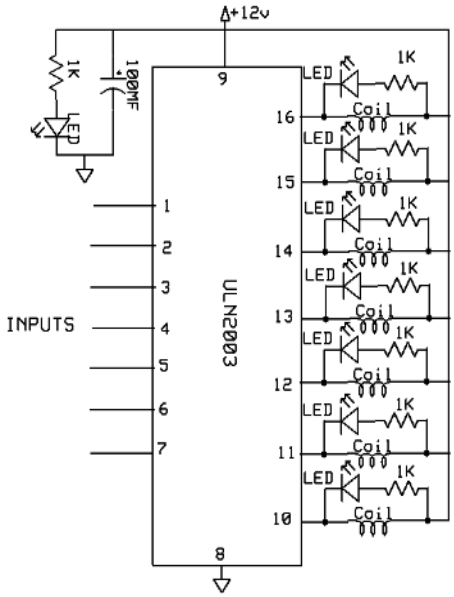

Figure 8:ULN 2003

LCD (Liquid Crystal Display) is used to display the values of the voltage and current sensor and the current status of the driver circuit is also is shown where the LCD are broadly classified in to two types they are

- Dynamic scattering type
- Field effect type

The Liquid crystal is the one of the several components though it remain in the Liquid form it exhibits the properties of the crystal where the liquid crystal is layered between the two glass sheets with the transparent electrode where the glass plates inner surface are coated with the transparent electrode. The liquid is transparent when it is not activated when it gets activated the molecular in the liquid cause the light to be scattered and the cell appears to be bright.

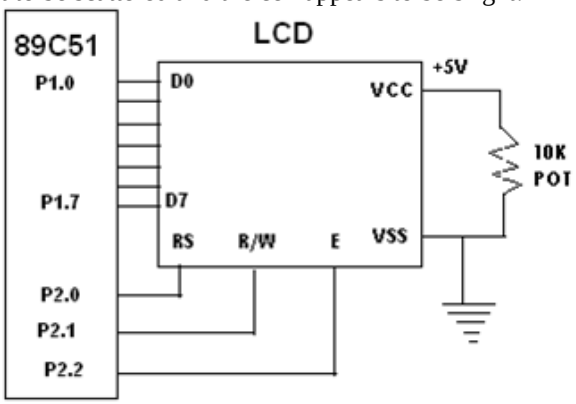

Figure 9: Interfacing LCD with Microcontroller

Simply the voltage divider circuit is used to read the input from the three phase power supply, and the current is also measured from the three phase power supply where the voltage and the current sensor are kept for all the three phases R,Y,B. the signal conditioning in the electronics means manipulating the analog signal to meets the requirements for the next stage for the further level of the Processing.It is most commonly used in all the type of analog and digital converters.

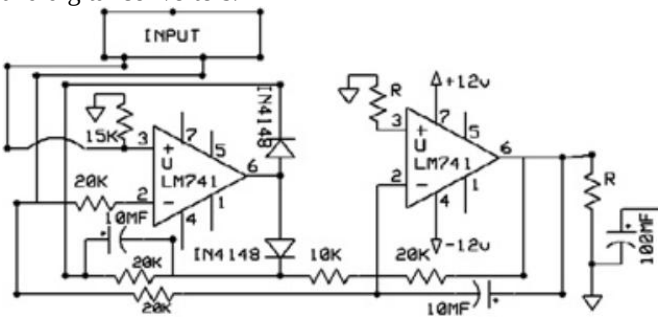

Figure 10: Signal controlling Unit

Most commonly in all control engineering applications sensing stage, signal conditioning stage and processing stage most commonly the amplification of the is carried out in the signal processing stage. The signal conditioners include DC voltage and current to accept the signal inputs the sensor inputs are the accelerometer, resistance, thermistor, thermocouple, strain gauge or bridge and LVDT for signal conditioning equipment the output are the voltage, current, relay, resistance or potentiometer. The conditioning of the signal include amplification, filtering, converting range matching for processing it after conditioning the most common signal conditioning function is the filtering not all the frequency spectrum signal contains valid data amplification of the signal performs two important functions it increases the resolution of the input signal it increases the signal to noise ratio for signal conditioning it includes Sample and hold amplifiers they are the peak detectors, log amplifiers instrumentation amplifiers, antilog amplifiers, programmable gain amplifiers.

3. Conclusion

The voltage and the current are connected to the sensor and the reading are given to the micro controller the three phase power supply is used in this where the minimum and the maximum voltage values are set the values are the 130 voltage to the 360 voltage the program is fed in to the microcontroller this ECB is used where the faster switching between the networks are occurred the driver and the wifi module ESP 8266 is to fed the values to the cloud for the live update of the values the driver and the relay are connected to the microcontroller this was completed successfully.

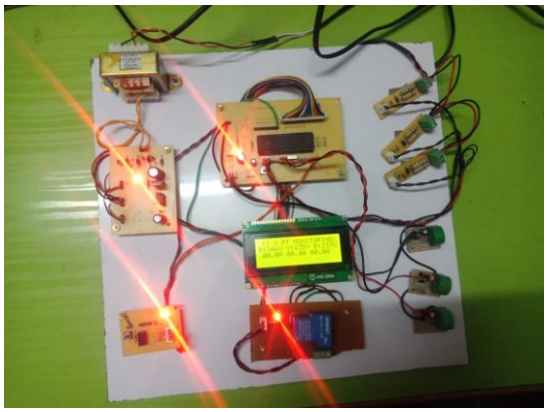

Figure 11: Prototype of ECB switch

4. Future Scope

This project can be further enhanced by the implementing this project in the smaller size and reducing the usage of the conventional relays.

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