



SASI INSTITUTE OF TECHNOLOGY & ENGINEERING

(Approved by AICTE-New Delhi, Affiliated to JNTUK-Kakinada and SBTET-Hyderabad)

TADEPALLIGUDEM - 534101, West Godavari District, Andhra Pradesh

☎ : 08818-244986,987,989,990 Fax:08818-244628 Web : www.sasi.ac.in, hodece@sasi.ac.in

Department of Electronics & Communication Engineering

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Annexure I

1. Project Title: Power Theft Analyzer

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1. Abstract & Objective

1.1 Abstract

The Power Theft Analyzer system prevents the illegal usage of electricity. At this point of technological development the problem of illegal usage of electricity can be solved electronically without any human control. The implementation of this system will save large amount of electricity, and there by electricity will be available for more number of consumer then earlier, in highly populated country such as INDIA. Every year the electricity companies fare the line loss at an average (20-30)% according to power ministry WAPDA Company's loss more than RS125 billion. Now a day's finding power theft from the power transmission lines by using hooks is very difficult for concern authorities.

The Power Theft Analyzer system that raises an alarm and displays the power theft area of the distribution transformer at substation by calculating the real consuming power by the energy meter and the main power at the distribution transformer. That means the real consumption of all users must be equals to the total power delivered by the transformer. The difference must be analyzed by the controller by calculating both powers. If the difference is within +2 to 3% variation (transmission losses are concerned) the system raises no error otherwise it wills generates error with an alarm and sends message along with transformer location information. At present nobody is using this particular process in India. It is a useful project for avoiding power thefts due to this we may save revenue around 5 to 10%. In future we may extend the same thing. Information is directly sent to PC or to concern authority via GSM link in the form of SMS.

1.2 Motivation

Now a day's technology is on the raising slope, we should also note the increasing immoral activities. With a technical view, "Power Theft" is a non-ignorable crime that is highly prevalent, and at the same time it was directly affects the economy of a nation. Electricity theft is a social evil, so it has to be completely eliminated. Power consumption and losses have to be closely monitored so that the generated power is utilized in a most efficient manner.

Main aim of our project:

1. Save the Power

2. Avoid Power Theft

3. Identify theft

1.3 Objective

The main aim of this project is to present the idea of a fully “Power Theft Analyzer” having capabilities like identify the power theft area and street.

2. Block Diagram & Technical Specifications

2.1 Block Diagram and Working:

2.1.1. Block Diagram:

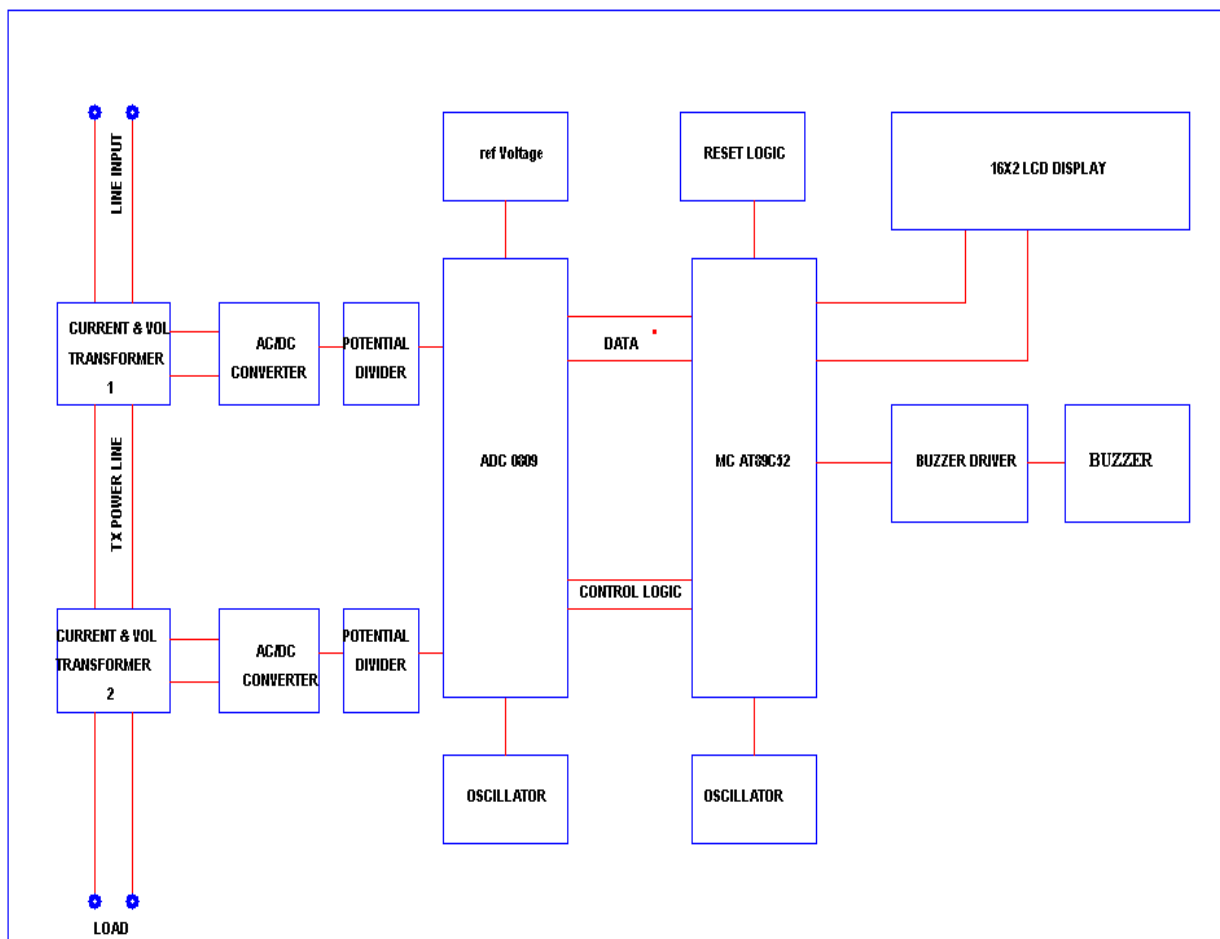
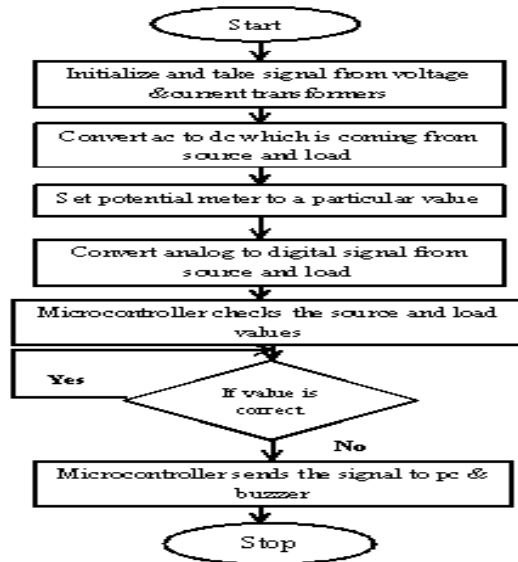


Figure 3.1: Block Diagram of Power Theft System

2.1.2. Flow Chart:



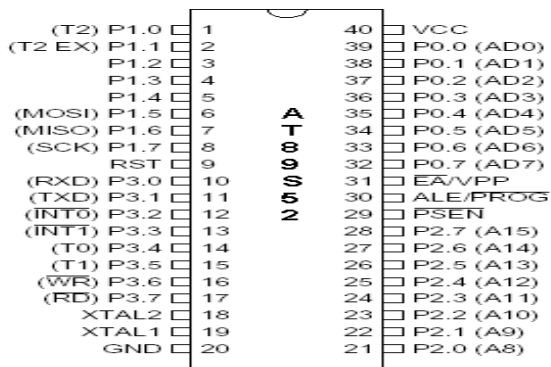
2.1.3. Working:

the block diagram of the power theft analyzer. It counts consumer units and compares then it gives to the pc. continuously reads the data in the PC (control center) and saves the real time data in the data base for future references. Whenever the voltage goes beyond the operating limits due to any faults on either source side or load side, then the controller raises the alarm and alerts the operator through an alert signal and trips the circuit with no time delay in order to protect the equipment without operator intervention .This system gives two separate signals for abnormal conditions i.e., one for above the range and one for below the range set by the operator. The input a.c. supply is stepped down from 230V to 12-0-12V. The rectifier consists of diodes D1 and D2 makes the supply D.C. that is, unidirectional waveform. The output from rectifier is a URDC, whose value is 12.726V peak to peak. The voltage regulator makes this URDC to RDC of +5V. The capacitor C1 is used to maintain constant voltage between two consecutive positive cycles whereas C2 is used to remove the fluctuations caused by regulator. Here we are selecting 12.726V as a peak value. Because of fluctuations, the peak voltage may decrease, then regulator cannot step up to +5V. If we select peak value, a higher one, then the problem can be overcome.

2.2 Technical Specifications:

2.2.1. Micro Controller 89C52

A Micro controller consists of a powerful CPU tightly coupled with memory, various I/O interfaces such as serial port, parallel port timer or counter, interrupt controller, data acquisition interfaces-Analog to Digital converter, Digital to Analog converter, integrated on to a single silicon chip.If a system is developed with a microprocessor, the designer has to go for external memory such as RAM, ROM, EPROM and peripherals. But controller is provided all these facilities on a single chip. Development of a Micro controller reduces PCB size and cost of design.One of the major differences between a Microprocessor and a Micro controller is that a controller often deals with bits not bytes as in the real world application. Intel has introduced a family of Micro controllers called the MCS-51.



4.1.2 The Major Features

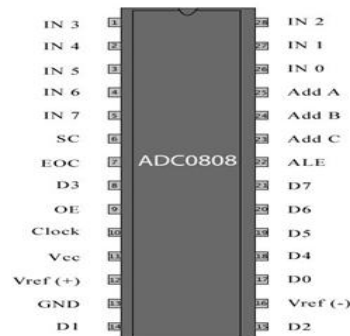
- Compatible with MCS-51 products
- 4k Bytes of in-system Reprogrammable flash memory
- Fully static operation: 0HZ to 24MHZ
- Three level programmable clock
- 8 –Bit timer/counters
- Six interrupt sources
- Programmable serial channel

2.2.2. Analog to Digital Converter (ADC):

The ADC0808 data acquisition component is a monolithic CMOS device with an 8-bit analog-to-digital converter, 8-channel multiplexer and microprocessor compatible control logic. The 8-bit A/D converter uses successive approximation as the conversion technique. The converter features a high impedance chopper stabilized comparator, a 256R voltage divider with analog switch tree and a successive approximation register. The 8-channel multiplexer can directly access any of 8-single-ended analog signals. The device eliminates the need for external zero and full-scale adjustments. Easy interfacing to microprocessors is provided by the latched and decoded multiplexer address inputs and latched TTL tri-state outputs. The design of the ADC0808 has been optimized by incorporating the most desirable aspects of several A/D conversion techniques. The ADC0808 offers high speed, high accuracy, minimal temperature dependence, excellent long-term accuracy and repeatability, and consumes minimal power. These features make this device ideally suited to applications from process and machine control to consumer and automotive applications.

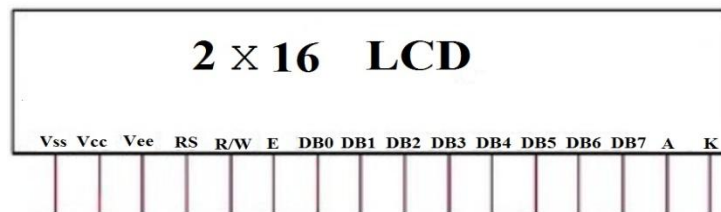
4.2.1 Features

1. Easy interface to all microprocessors
2. Operates ratio metrically or with 5 VDC or analog span adjusted voltage reference
3. No zero or full-scale adjust required
4. 8-channel multiplexer with address logic
5. 0V to 5V input range with single 5V power supply

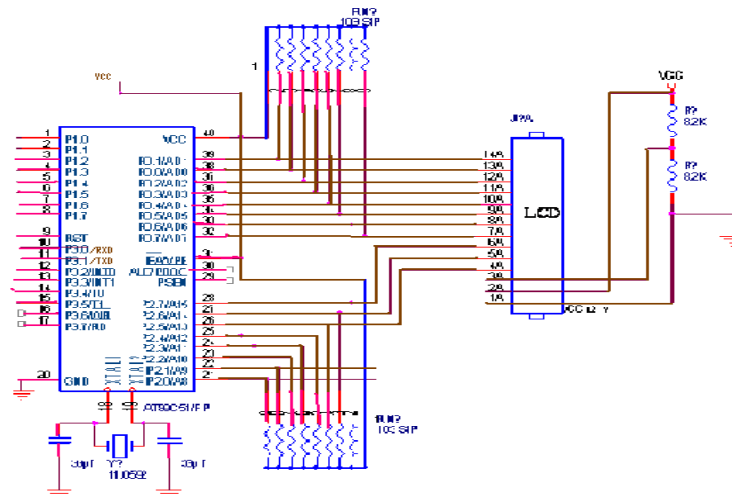


2.2.3. Liquid Crystal Display (LCD)

LCDs are more energy efficient and offer safer disposal than CRTs. Its low electrical power consumption enables it to be used in battery-powered electronic equipment. It is an electronically modulated optical device made up of any number of segments filled with liquid crystals and arrayed in front of a light source (backlight) or reflector to produce images in color or monochrome. The most flexible ones use an array of small pixels. The earliest discovery leading to the development of LCD technology, the discovery of liquid crystals. It is an electronically modulated optical device made up of any number of segments filled with liquid crystals. The most flexible ones use an array of small pixels.



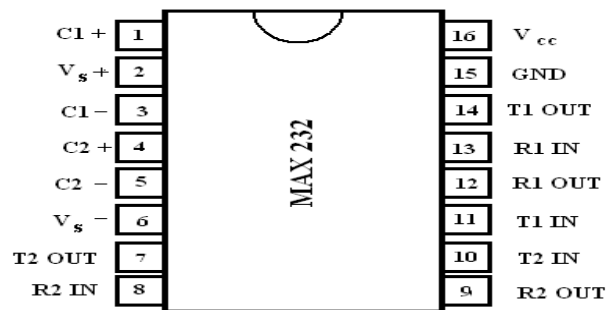
2.2.4. Interfacing of LCD



2.2.5. Rs-232 and TTL Logic

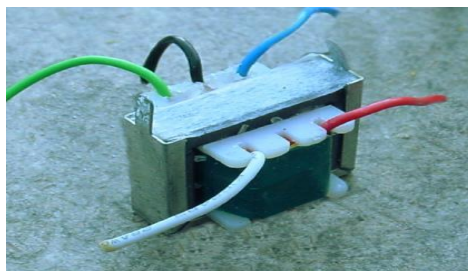
Thus the RS-232 signal levels are far too high **TTL electronics**, and the negative RS-232 voltage for high can't be handled at all by computer logic. To receive serial data from an RS-232 interface the voltage has to be reduced. Also the low and high voltage level has to be

inverted. This level converter uses a **Max232** and five **capacitors**. The max232 is quite cheap (less than 5 dollars) or if you are lucky you can get a free sample from **Maxim**. The MAX232 from **Maxim** was the first IC which in one package contains the necessary drivers and receivers to adapt the RS-232 signal voltage levels to TTL logic.



2.2.6. 12-0-12 Step Down transformer

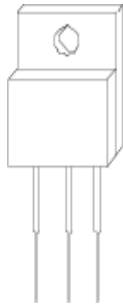
The transformer is a device that transfers electrical energy from one electrical circuit to another electrical circuit through the medium of magnetic field and without a change in the frequency. The electric circuit which receives energy from the supply mains is called primary winding and the other circuit which delivers electric energy to the load is called the secondary winding.



2.2.7. 7805 Voltage Regulator

The Digital lab board can use any power supply that creates a DC voltage between 6 and 12 volts. A 5V voltage regulator (7805) is used to ensure that no more than 5V is delivered to the

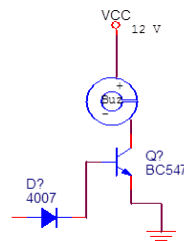
Digi lab board regardless of the voltage present at the J12 connector (provided that voltage is less than 12VDC). The regulator functions by using a diode to clamp the output voltage at 5VDC regardless of the input voltage - excess voltage is converted to heat and dissipated through the body of the regulator.



The 7805 +5VDC voltage regulator produces a 5VDC output as long as 6VDC to 12VDC is input.

2.2.8. Buzzer Driver

A buzzer or beeper is a signaling device, usually electronic, typically used in automobiles. Now-a-days, it is more popular to use a ceramic-based piezo-electric sounder like a Sonalert which makes a high-pitched tone. Usually these were hooked up to driver circuits which varied the pitch of the sound or pulsed the sound on and off.



2.2.9. LM555 Astable Multivibrator

The 555 timer is used as an interrupt signal for the microprocessor. Some of the features of 555 timer are

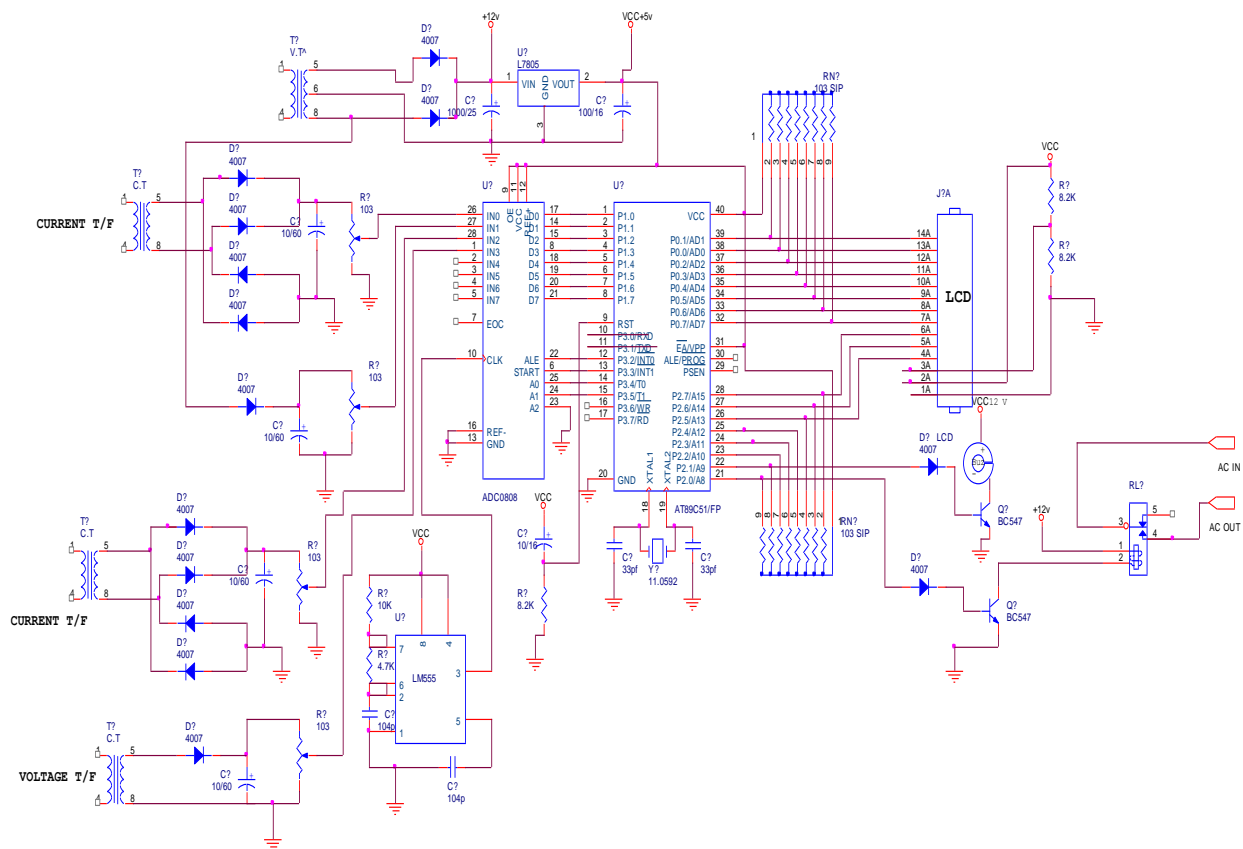
- Timing from microseconds to hours.
- Astable or monostable operation
- Adjustable duty cycle
- TTL-Compatible output can sink or source up to 200mA
- Designed to be interchangeable with signetics

2.2.10. Relay or Electro-Mechanical Switch

It is a mechanical switch which is operated electrically to turn ON or OFF current in an electrical switch. Some of the advantages by using relays are

1. The relay requires a small power for its operation. This permits to control a large power in the load by a small power to the relay circuit. Thus a relay acts as a power amplifier i.e. it combines control with power amplification.
2. The switch in the relay coil carries a small current as compared to the load current. This permits the use of a smaller switch in the relay coil circuit.
3. The operator can turn ON or OFF power to a load even from a distance. This is a very important advantage when high voltages are to be handled.
4. There is no danger sparking as the turning ON or OFF is carried by the relay coil switch which carries a small current. But the speed operation is very small

2.2.11. Schematic Diagrams

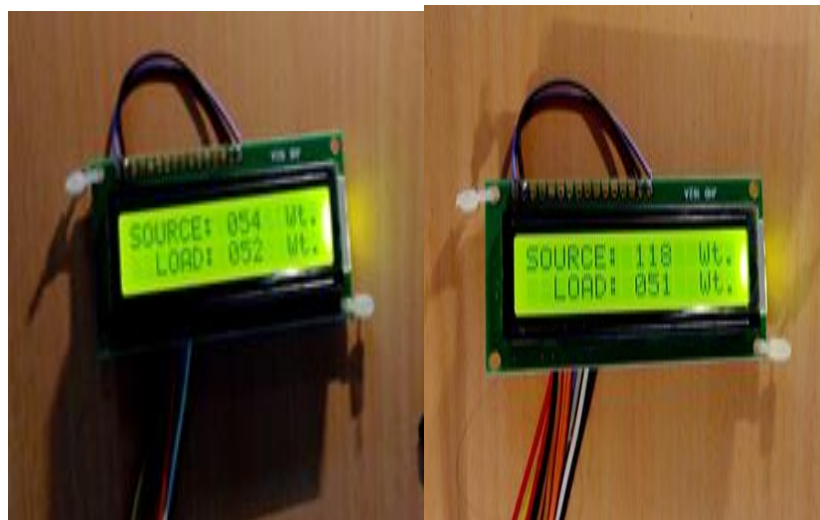


2.3. Results & Analysis

Below diagrams shows the circuit(hardware) setup of automatic toll detection system. programming is done using embedded c.



The below **figures** shows the normal and abnormal conditions of the system. The normal and abnormal conditions of the source and load values are showed in the figures.



The **Figures** shows the LCD displays the values during the normal and abnormal conditions.



Figure shows which transformer is thefted. Now if the theft is done out of the total number of units then it shows which transformer is stealing.

3. Conclusion

3.0. Conclusion

In this way without much human effort, by using SCADA system we can monitor the generating unit in a power plant and can control the performance automatically. The data stored in the database is used for the further studies like load flow analysis, fault studies, future extension, expansion of the existing power system.