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89S52 MICROCONTROLLER BASED ADVANCED ELECTRICITY CONSUMPTION MONITORING SYSTEM

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ABSTRACT

In a 21st century where technology improves very fast. Simultaneously we require a automation system which will provide us security and has good reliability .From all the technologies , we have proposed an advanced automated electricity meter for various application such as agricultural , industrial , residential . Presently farmers are provided with a facility such as power subsidy in which per unit rate of power consumption are reduced for unlimited use or given free units of power for particular time period ,but most of the people are misusing the facility given by government ,they are using excess power beyond their requirement Our proposed system using 89S52 microcontroller monitors proper consumption of electricity it provides not only required power but also it informs about consumption of power and when consumption goes beyond set requirement, the facility given by government will be withdrawn for next use , they will be charged for further consumption .

Keywords*: *Automation, Subsidy, Consumption, 89S52 Microcontroller.

I. INTRODUCTION

Electrical power has become crucial to human survival and progress. Apart from efforts to meet growing demand, automation in the energy distribution is also necessary to enhance people's life standard. [1] Over consumption of electricity is a major problem of every country. In India, as the population is increasing day by day, the inclination towards energy consumption is also increasing rapidly. The amount of energy generated is not sufficient in comparison with the energy consumed by the user. In spite of the fact that proportion of energy consumption differs from the energy generated. The government provides the schemes or subsidies to the agricultural sector in a particular situation. To enhance or improve the condition of agricultural sector, one of the subsidies given by government is power subsidies, in which the agricultural sector gets power (electricity) at a subsidised rate. This power is being over consumed by the users and can be used for different purposes. Suppose if a consumer is using power of 300kw of energy at a subsidised rate but he practically needs only 200kw the excessive use of 100kw can be avoided if there is a system available for monitoring the energy

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consumption. For this purpose we propose to implement a system in which the consumption can be automatically monitored. In this system the power supply provider can add a energy consumption limit and when the limit is about to cross the consumer will be alerted by two mediums which will be led and buzzer and once the consumption limit is crossed he will charged as per regular rate. Apart from agricultural sector, in residential, commercial and industrial sector the consumer is unaware of the energy he consumes. So this system enables the consumer to monitor his energy consumption. He can also add a limit to his consumption and pay according to the usage. This system will be able to reduce energy consumption in every sector.

II. SYSTEM REQUIREMENTS

The system in this paper proposes consist of consists of AT89S52 microcontroller, current transformer, current to voltage converter, signal conditioning circuit, LCD, keypad and buzzer. The block diagram of proposed system is as follows.

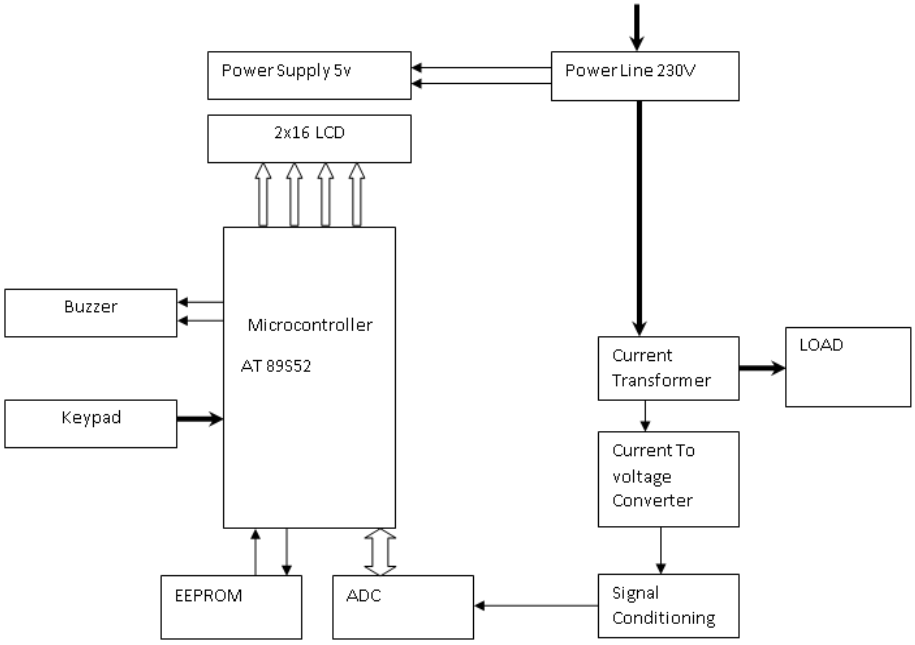

Fig 1: Basic Block Diagram of the Advanced Electricity Consumption Monitoring System.

2.1 At89s52 Microcontroller

The AT89S52 is a low-power, high-performance CMOS 8-bit microcontroller with 8K bytes of in-system programmable Flash memory. The AT89S52 provides the following standard features: 8K bytes of Flash, 256 bytes of RAM, 32 I/O lines, Watchdog timer, two data pointers, three 16-bit timer/counters, a six-vector two-level interrupt architecture, a full duplex serial port, on-chip oscillator, and clock circuitry. In addition, the AT89S52 is designed with static logic for operation down to zero frequency and supports two software selectable power saving modes..

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2.2 Current Transformer

A current transformer (CT) is a transformer that is used to produce an alternating current (AC) in its secondary which is proportional to the AC current in its primary. It is defined as an instrument transformer in which the secondary current is substantially proportional to the primary current (under normal conditions of operation) and differs in phase from it by an angle which is approximately zero for an appropriate direction of the connections. Current transformers are usually either measuring or protective types. When a current is too high to measure directly or the voltage of the circuit is too high, a current transformer can be used to provide an isolated lower current in its secondary which is proportional to the current in the primary circuit.

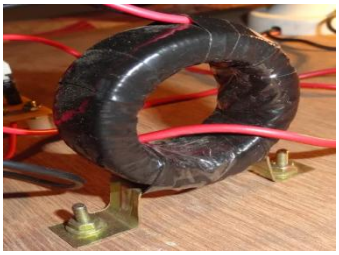

Fig.2 Current Transformer

2.3 LCD

LCD (liquid crystal display) is the technology used for displays in notebook and other smaller computers. Like light-emitting diode (LED) and gas-plasma technologies, LCDs allow displays to be much thinner than cathode ray tube (CRT) technology. LCDs consume much less power than LED and gas-display displays because they work on the principle of blocking light rather than emitting it.

2.4 Current To Voltage Converter

A current to voltage converter will produce a voltage proportional to the given current. This circuit is required if your measuring instrument is capable only of measuring voltages and you need to measure the current output. If your instrument or data acquisition module (DAQ) has a input impedance that is several orders larger than the converting resistor, a simple resistor circuit can be used to do the conversion. However, if the input impedance of your instrument is low compared to the converting resistor then the following op-amp circuit should be used.

2.5 Signal Conditioning Circuit

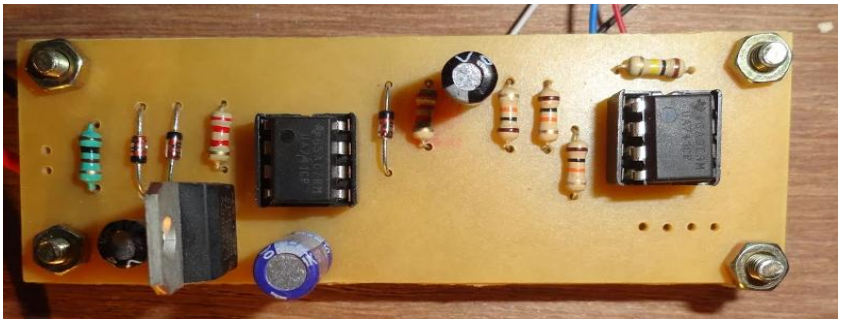

Fig. 3 Signal Conditional Circuit used in proposed System

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Signal conditioning can include amplification, filtering, converting, range matching, isolation and any other processes required to make sensor output suitable for processing after conditioning Filtering is the most common signal conditioning function, as usually not all the signal frequency spectrum contains valid data. The common example is 50 Hz AC power lines, present in most environments, which cause noise if amplified. Signal amplification performs two important functions: increases the resolution of the input signal, and increases its signal-to-noise ratio. For example, the output of an electronic temperature sensor, which is probably in the millivolts range, is probably too low for an analog-to-digital converter (ADC) to process directly. In this case it is necessary to bring the voltage level up to that required by the ADC .Signal isolation must be used to pass the signal from the source to the measuring device without a physical connection: it is often used to isolate possible sources of signal perturbations. Also notable is that it is important to isolate the potentially expensive equipment used to process the signal after conditioning from the sensor.

III. METHODOLOGY

Microcontroller 89S52 is the central component which controls all the activities like reading data from serial port, writing and reading data to/from EEPROM, displaying information on LCD (Liquid Crystal Display), controlling buzzer.230 V ac mains supply is given to current transformer, it is used to measure the current. This current cannot be measured by ADC, so current transformer output is given to current to voltage converter will convert the current into voltage. Still this voltage is in ac and in milli volts which cannot be measured by ADC. Thus output of current to voltage converter is given to signal conditioning. It performs the main function, it is used to rectify the ac voltage, then amplify it and then convert it into dc voltage .The voltage coming to the ADC will be proportional to the current consumed by the load through ADC, voltage will be given to the 89s52 Microcontroller. The microcontroller will calculate each unit depending on the consumption by load and each unit will be incremented as the load increases .This data will be saved in EEPROM. Keyboard is used to set limit on the power consumption. The limit applied by the keyboard will be given to EEPROM. LCD16*2(2 line of 16 character) display is used to display the limit, to display the units being consumed. Buzzer is used for audio indication. Power supply 5v is required to the circuit.

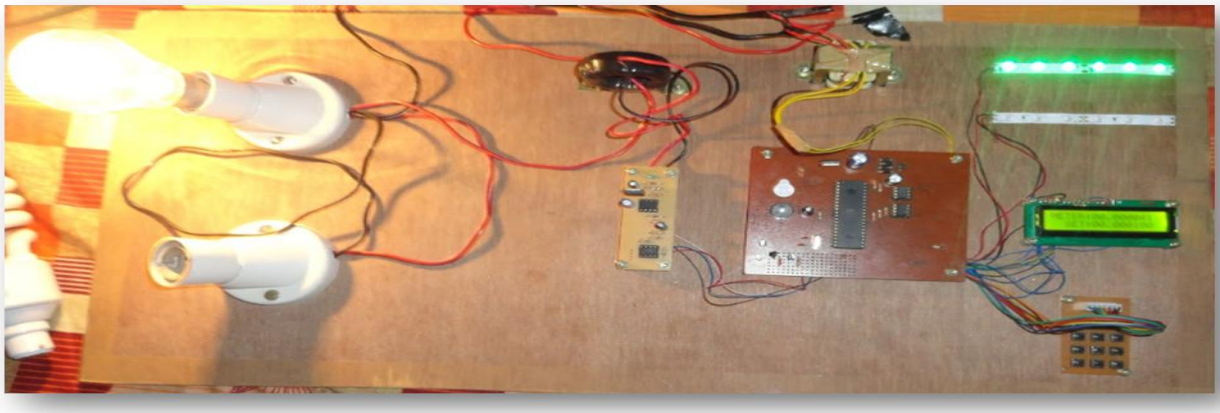

Fig 4: PCB Showing Controller and Interfaced Components.

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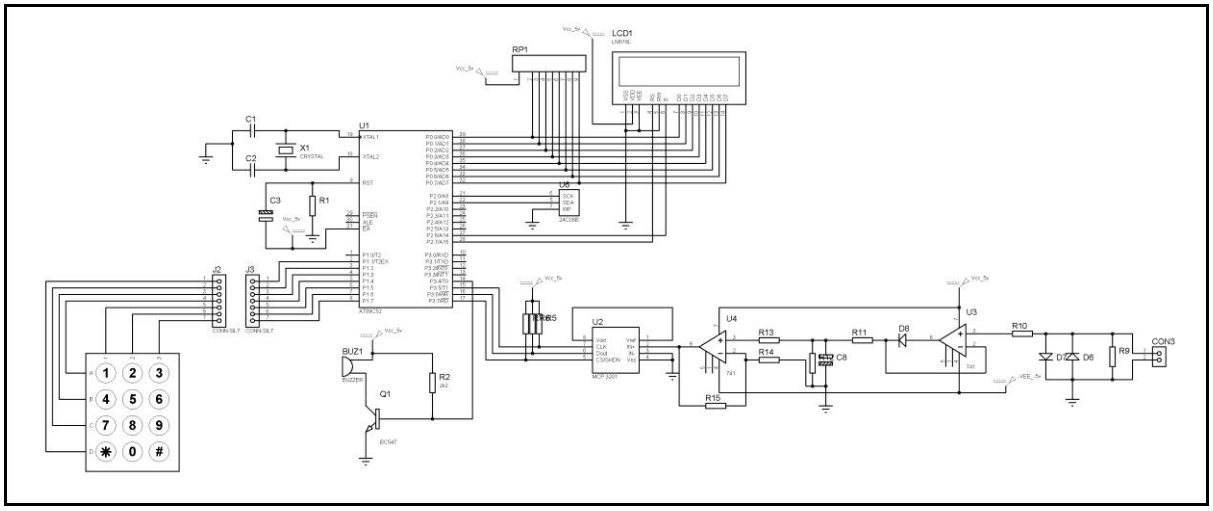

Fig 5: Circuit Diagram of the Advanced Electricity Consumption Monitoring System.

IV. RESULTS AND DISCUSSION

The main focus of our project is to monitor the electricity consumption. so the user has to set a limit for the consumption .for example the user set a limit of 100 unit, first the energy meter will glow green led indicating that the user consumption has not exceed and when the set limit has been crossed the user will be alerted by red light led and sound which is generated by the buzzer. The sound will be made by the buzzer after every increasing unit.

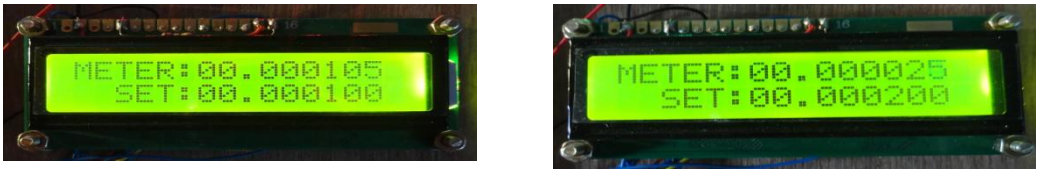

Fig 6: Sample Results on Display

V. CONCLUSION

The proposed system enables the consumer to monitor his energy consumption. He can also add a limit to his consumption and pay according to the usage. This system will be able to reduce energy consumption in every sector.

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