iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 6 **Issue:** IV **Month of publication:** April 2018

DOI: http://doi.org/10.22214/ijraset.2018.4192

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International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 6.887
Volume 6 Issue IV, April 2018- Available at www.ijraset.com

Wireless Energy Meter Reading System Using RF Module

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Abstract*: *In this paper we are using new technology of energy meter reading collection. In past energy meter reading collection use many method, but this method is same loss is occurs. In this paper we are use RF module for wireless energy meter reading collection system. In this case use RF base transmitter which is present at each and every consumer location. This transmitter calculates consumption of customer and send to receiver with the help of RF module. Another side of this system is RF base receiver. RF base receiver is single device. RF base receiver collect all RF base energy meter reading at less time. After RF base receiver is connect to PC using max 232 ports and stored all data in PC. After bill process is completed. Today quantity of customer is continuous increases. So meter reading collection of this all customer is very typical. Using this RF base energy meter reading it is very simple to collect meter reading.

Keywords*: *Radio frequency module, Signal conditions circuit, Current transformer, Automatic meter reading, LCD.

I. INTRODUCTION

At present condition quantity of customer continuous increases. Quantity of customer increases at that time quantity of energy meter is increases. For this condition collection process of meter reading is very difficult and more time consume. Solution of this condition use wireless communication devices. In this paper we are collecting wireless energy meter reading with the help of RF modules. In this proposed system consist two part first is RF based transmitter and second part is RF based receiver. Customer is consumed electrical power continually. This duly consumption is count or calculates RF based energy meter. RF base energy meter is connected customer electrical network. Each and every customer provide RF base energy meter.

In energy meter present communication devices and this proposed system we are use RF transmitter. RF transmitter pass data wireless. RF transmitter collects all data and send to RF base receiver. RF base receiver is movable part. Observer carry receiver and pass to all area of city where wireless energy meter is present. When RF receiver enters in city area at that time all transmitter send data to RF receiver and RF receiver receive all data [1]-[2].

After collecting all data RF receiver is connect to PC with help of MAX 232 port. When receiver connect to PC at that time all received data can be display in PC. In this case receiver display customer ID and current consumption i.e. unit. This all data display in hyper terminal software in PC. Figure 1 shows diagram of proposed system.

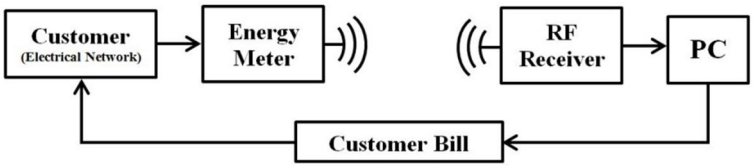

Fig. 1 Proposed System

In figure proposed system cycle. First part is electrical network that is customer. Next part is energy meter which is count or calculate consumption of customer. This consumption is send wireless to receiver with the help of RF transmitter. RF receiver is receives data from RF transmitter and provide to observer PC. After finding all data calculate and create customer energy consumption bill and send to customer.

II. METHODOLOGY

In this proposed system two main parts is use. First is RF transmitter. Figure 2 show block diagram of RF transmitter. In proposed system AT89s52 microcontroller is use for control. Main customer electrical network is connected to meter with the help of current transformer. Current transformer ratio is 20:1. Current transformer senses current and send to current to voltage converter block. Current to voltage converter block convert current signal to voltage and pass to signal condition circuit. Signal condition circuit remove any noise and spike. Anlog to digital converter block convert anlog signal to digital forms. This digital signal is provided to

microcontroller AT89S52. After completing process RF transmitter send signal to RF receiver with the help of RF module. LCD display for display consumer meter reading [4].

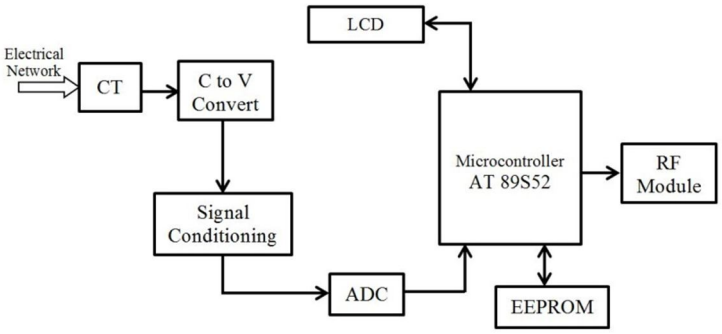

Fig. 2 Block diagram of RF Transmitter

Second part of this proposed system is RF receiver. RF receiver is to receive all transmitter data with in less time. Figure 3 shows block diagram of RF base receiver. In this receiver system also use microcontroller AT89S52. RF module is receiver data and stored in memory after collecting all data. Receiver is connected to PC with the help of MAX232 port and store data in PC.

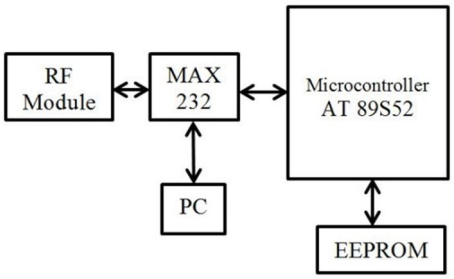

Fig. 3 Block diagram of RF Receiver

III.HARDWARE AND IMPLEMENTATION

In this section we work first in software part. Proposed system is first simulation in software and check out put and last implemented in hardware. Figure 4 and 5 shows schematic circuit diagram of RF transmitter and RF receiver respectively.

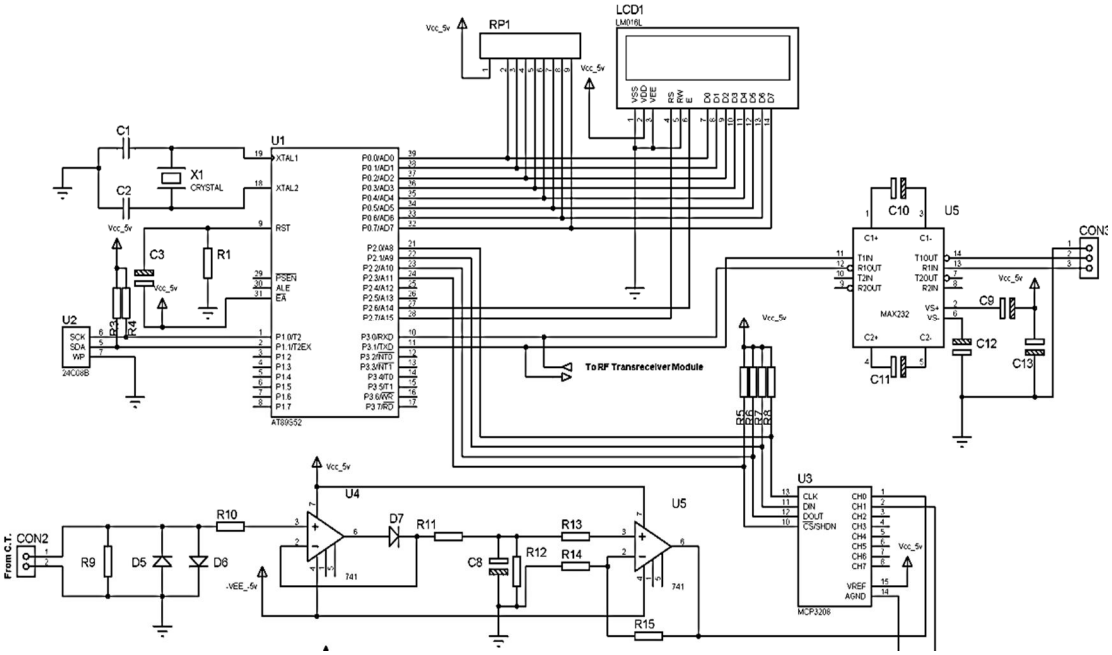

Fig. 4 Schematic Circuit Diagram of RF Transmitter

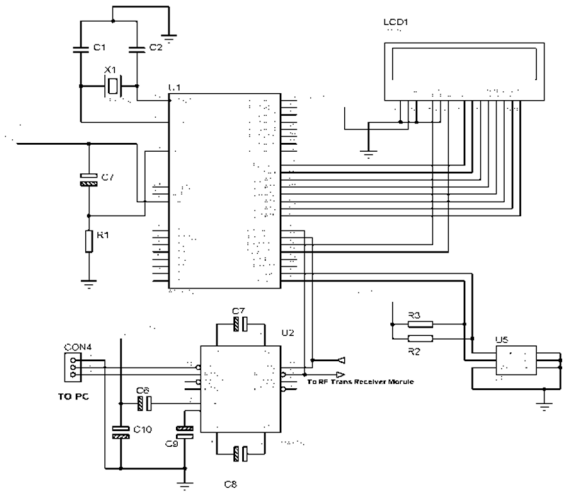

Fig. 5 Schematic Circuit Diagram of RF Receiver

A. Power Supply

In this case we use regulated power supply. Input of this circuit is single phase 230V, 50Hz AC supply. This is connected to step down transformer for voltage step down purpose. AC output of connected to full wave rectifier for convert AC to DC. After filter is AC components can be block and pure DC passes to regulator. Final output is 5V DC supply which is connected to circuit [5].

B. Signal Conditioning Circuit

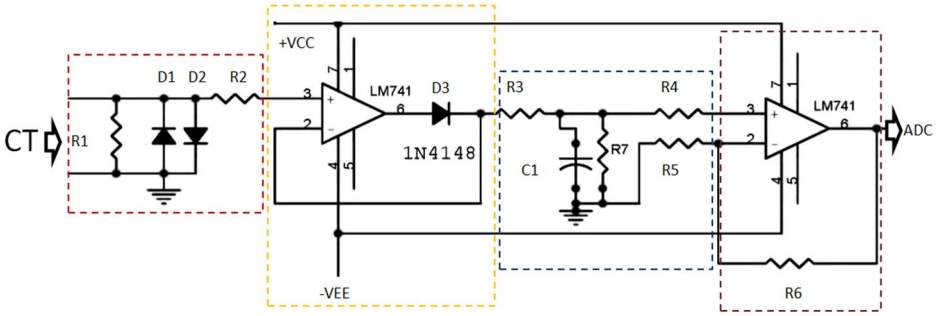

Fig. 6 Signal Conditioning Circuit

In this circuit input is given to current transformer. Resistance R1 is connected across the current transformer and it is convert current into voltage that is V=I X R1. Diodes D1 and D2 is connected for protection purpose which does not get voltage above +0.7 to -0.7V. We need to DC supply for circuit the AC supply is pass to active rectifier for converting AC to DC supply. This DC output is pulsating DC signal. Use filter for converting pulsating DC to fix DC signal. After this fixed DC signal is given to amplifier circuit.

C. ADC (MP3204)

Output of signal conditioning circuit is given to ADC (MP3204) circuit. ADC is converting analog into digital signal. After converting digital signal is proved to microcontroller AT 89s52.

D. EEPROM

Proposed system EEPROM 24c02 memory use for meter reading storage. Proposed system EEPROM is 2k bits memory is use for storage purpose. This 2k bits memory stored meter reading with meter ID.

E. MAX232

Max232 is serial communication device. Which interface receiver and PC. In microcontroller AT89S52 is stored 8 bit value and this value MAX 232 is send to PC for customer billing purpose.

F. Microcontroller AT89S52

Microcontroller AT89S52 is high performance and low power cmos 8 bit microcontroller. These microcontroller 8k bytes programmable flash memories with 256 X 8 bit internal RAM. Microcontroller AT89S52 is three 16 bit timer and counter provided. Important feature of this microcontroller is auto reset. Microcontroller performing operation and automatic rest which is not require pushing reset button at any time. This microcontroller is very powerful which is provided high flexible and cost effective solution to embedded controls. Microcontroller AT89S52 standard features is 256 bytes RAM, 32 I/O lines, full duplex serial port, clock circuitry, 16 bit timer counter, six vector 2 level interrupt architecture, watdog timer, 2 data pointers[6].

G. RF Module

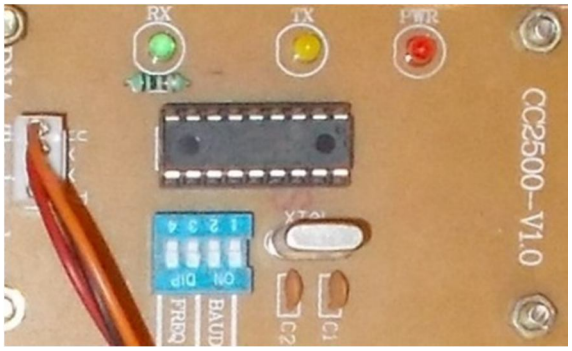

Fig. 7 RF Module

In proposed system we are use CC2500 RF module for wireless communication. RF module CC2500 is transreceiver module. It is easy RF communication at a 24 GHz. RF module CC2500 is use for both operation that is transmit and receive of meter reading data. Advantage of RF module CC2500 is no external coding extra hardware required.

After consideration of required components we are simulate the all circuit and successfully run. After completion of software process than we are implements hardware of proposed system. In figure 8 and 9 shows hard ware of proposed system [7].

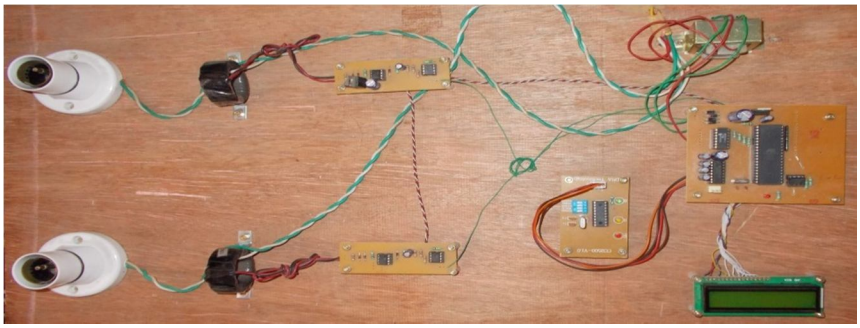

Fig. 8 Implementation of RF Transmitter

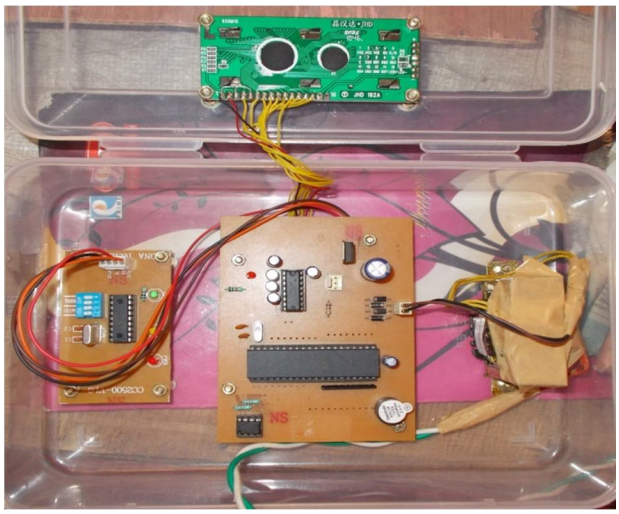

Fig. 9 Implementation of RF Receiver

IV. CONCLUSIONS

In this proposed system we are use RF module for transmitting and receiving of energy meter reading. After receiving energy meter reading to successfully stored customer ID and reading in PC with help of MAX 232 port. Proposed system design and simulate in software after implemented hardware and observe the meter reading. Using RF module wireless energy meter reading collection process is down.

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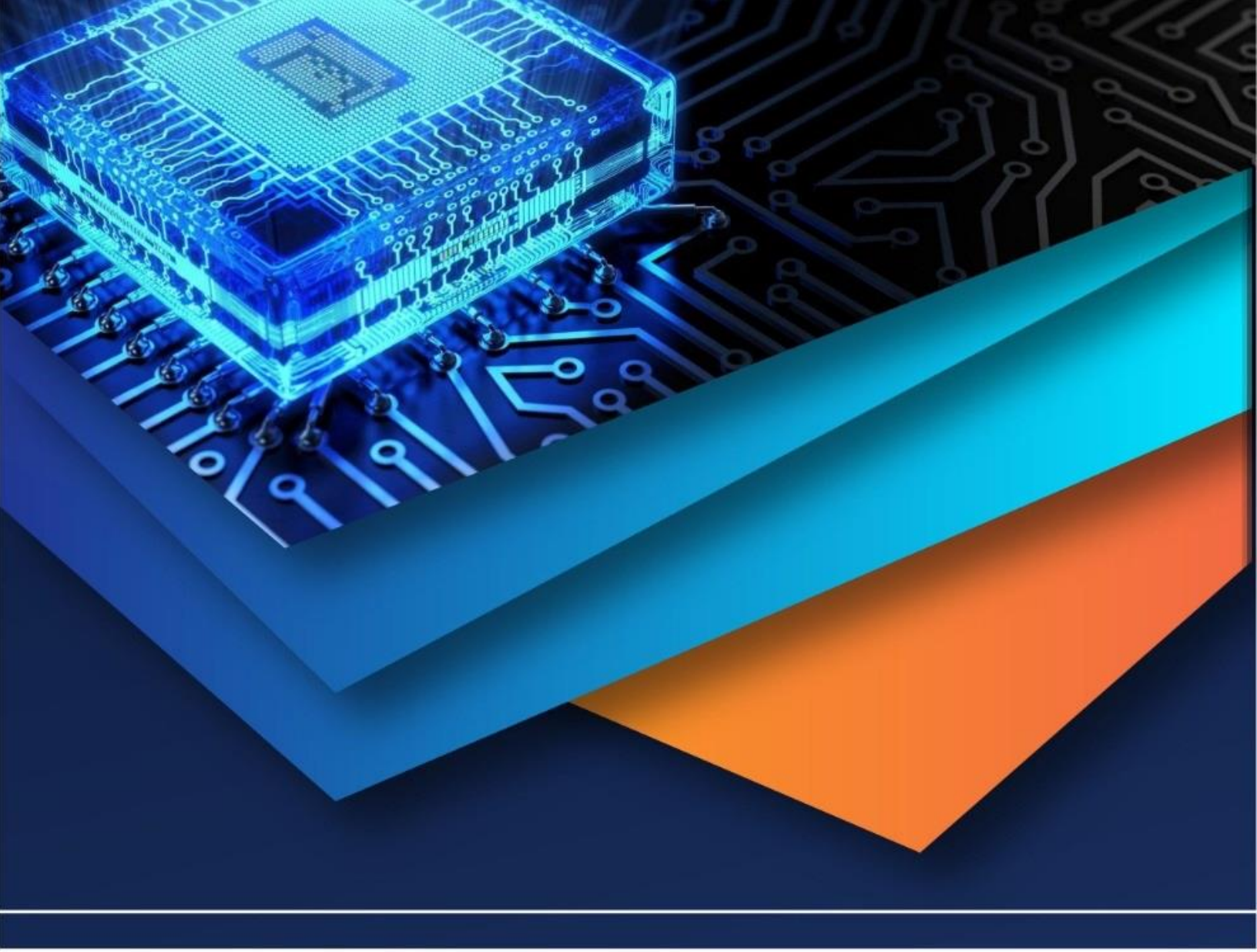

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