Wireless Energy Meter reading on hand-held device based on RF Transceiver

The purpose of this project is to remote monitoring and control of the Digital Energy Meter. This system enables the Electricity Department to read the meter readings regularly without the person visiting inside each house. This can be achieved by the use of Microcontroller unit that continuously monitors and records the Energy Meter readings in its permanent (non-volatile) memory location. This system also makes use of a RF Transceiver for transmitting the readings of Energy Meter.

RF Communication ranges in between 30 KHz to 300 GHz. RF communication works by creating electromagnetic waves at a source and being able to pick up those electromagnetic waves at a particular destination. These electromagnetic waves travel through the air at near the speed of light. The wavelength of an electromagnetic signal is inversely proportional to the frequency; the higher the frequency, the shorter the wavelength. RF transceiver has both transmitter and receiver section with it.

The Microcontroller based system continuously records the readings and the live meter reading can be sent to the Hand held device. The receiver end comprises of RF Transceiver, which receives the data from the transmitter. The data received at the receiver end is fed to the microcontroller present at the receiving end. The microcontroller at the receiving end is provided with a LCD. The readings received is processed and displayed on the LCD. The Microcontroller is programmed using Embedded C language.

The major advantages of this system are making use of RF transceiver modules which helps for a wireless transmission and the readings can be seen on hand held device (LCD display).

The main features of this project are:

1. Wireless Meter Reading transmission.
2. High accuracy.
3. Instantaneous display on hand held device.

The device provides learning's on the fallowing advancements:

1. RF technology.
2. Interfacing of RF transceiver module with Microcontroller.
3. LCD interfacing with Microcontroller.
4. Energy meter interfacing with Microcontroller.
5. Embedded C programming.
6. PCB design.

The major building blocks of this project are:

1. Regulated Power supply.
2. Microcontrollers.
3. RF transceiver modules.
4. Energy meter.
5. Optocoupler.
6. Reset.
7. LCD display with driver.
8. Crystal oscillator.
9. LED indicators.

Software's used:

1. PIC-C compiler for Embedded C programming.
2. PIC kit 2 programmer for dumping code into Micro controller.
3. Express SCH for Circuit design.
4. Proteus for hardware simulation.

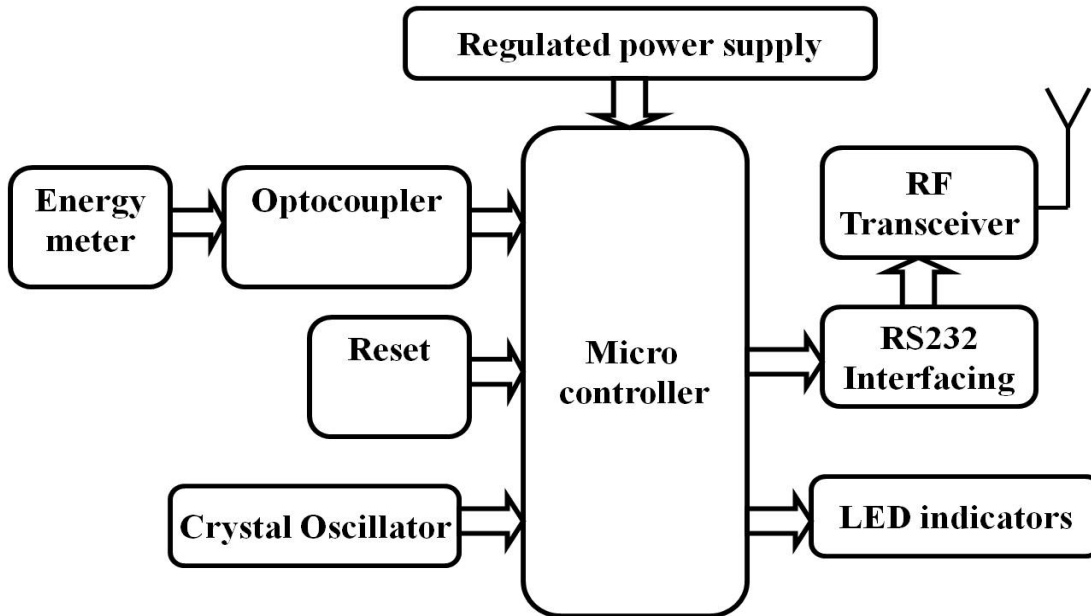**Regulated Power Supply:**
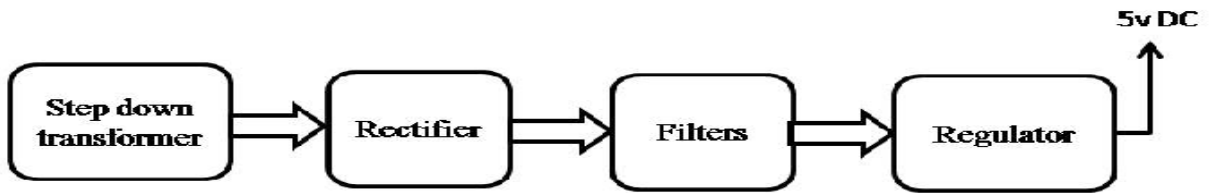
Block diagram:

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1. Transmitter

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2.Receiver

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                    ┌─────────────────────────┐
                    │  Regulated power supply  │
                    └─────────────────────────┘
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                                ▼
  Y    ┌──────────────┐   ┌───────────────┐   ┌────────────┐   ┌──────────┐
  │    │      RF       │   │               │──▶│    LCD     │──▶│   LCD    │
  └───▶│  Transceiver  │   │               │   │   driver   │   └──────────┘
       └──────────────┘    │               │   └────────────┘
               │           │               │
               ▼           │     Micro      │   ┌────────────┐
       ┌──────────────┐    │   controller   │◀──│   Reset    │
       │    RS232      │──▶│                │   └────────────┘
       │  Interfacing  │   │                │
       └──────────────┘    │                │
                           │                │──▶┌────────────┐
  ┌──────────────────┐     │                │   │ LED indicators │
  │ Crystal Oscillator │──▶│                │   └────────────┘
  └──────────────────┘     └───────────────┘
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