IOT BASED EFFICIENT BATTERY MONITORING SYSTEM FOR E-VEHICLES

AIM:

Design and development of IOT based Efficient Battery Monitoring System for E-Vehicles.

PURPOSE:

Battery monitoring system is very important for EV vehicle industry. Customized battery monitoring systems are available in battery but they do just balancing of cells and provide protection of charge and discharge of battery. We need smart BMS that will have additional features like data logging and IOT server interface. We proposed IOT based battery monitoring system that will store voltage, current, temperature values in SD card and send this information to IOT server.

DESCRIPTION:

IOT module (ESP32) and Bluetooth (HC-05) interfaced to Arduino UART port. SD card connected to Arduino SPI port. DS1307 is a RTC module that will provide real time date and time information while data storing into SD card (memory card). Voltage and current sensors interfaced to Arduino analog pins.

WORKING:

Arduino continuously reads voltage, current and temperature values of battery and displaying on 16x2 LCD display. For every one minute time Arduino sends these values to IOT server through HTTP protocol with the help of ESP32. This information stored in SD card (memory card). This information is useful, when battery needs service or repair. In server this log information will display on graphs format to easy analysis. Using Bluetooth app user can set time if corrupted in RTC module.

TECHNICAL SPECIFICATIONS:

HARDWARE:

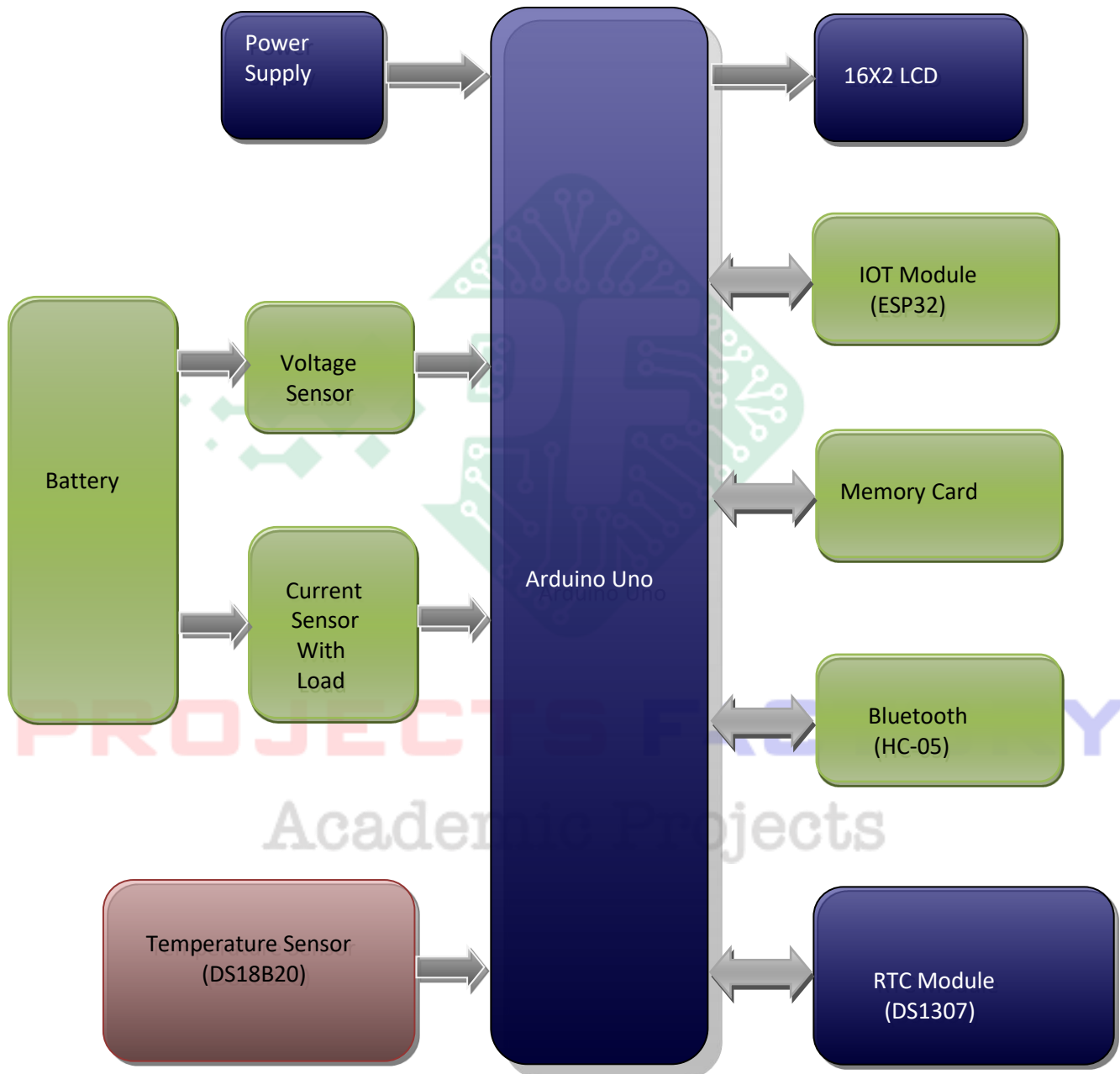|		
Microcontroller	:	Arduino Uno
Crystal	:	16 MHz
LCD	:	16x2 LCD display
IOT module	:	ESP32
Temperature Sensor	:	DS18b20
SD card	:	SPI interfaced
Voltage Sensor	:	Resistor based voltage divider
Current Sensor	:	Shunt resistor
RTC	:	DS1307
Bluetooth	:	HC-05
Power Source	:	12v 1 amp DC battery

SOFTWARE:

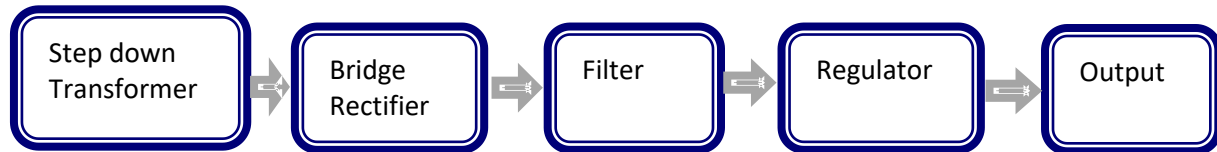Arduino IDE

Proteus based circuit diagram

APPLICATIONS:

➢ Battery monitoring system

➢ EV battery health monitoring system

➢ Solar plant monitoring

➢ Battery management applications

BLOCK DIAGRAM:

```
                          ┌─────────────┐                    ┌─────────────┐
                          │ Power       │ ───────►           │ 16X2 LCD    │
                          │ Supply      │                    │             │
                          └─────────────┘                    └─────────────┘

                                                             ┌─────────────┐
                          ┌─────────────┐                    │ IOT Module  │
                          │ Voltage     │ ───────►  ◄──────► │ (ESP32)     │
            ┌─────────┐   │ Sensor      │                    └─────────────┘
            │         │─► └─────────────┘        Arduino
            │ Battery │                           Uno         ┌─────────────┐
            │         │                                ◄────► │ Memory Card │
            │         │   ┌─────────────┐                    └─────────────┘
            └─────────┘─► │ Current     │
                          │ Sensor      │ ───────►           ┌─────────────┐
                          │ With        │                ◄──►│ Bluetooth   │
                          │ Load        │                    │ (HC-05)     │
                          └─────────────┘                    └─────────────┘

            ┌───────────────────┐                            ┌─────────────┐
            │ Temperature Sensor│ ───────►              ◄──► │ RTC Module  │
            │ (DS18B20)         │                            │ (DS1307)    │
            └───────────────────┘                            └─────────────┘
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POWER SUPPLY BLOCKDIAGRAM:

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┌─────────────┐    ┌─────────────┐    ┌─────────┐    ┌─────────────┐    ┌─────────┐
│ Step down   │ ═> │ Bridge      │ ═> │ Filter  │ ═> │ Regulator   │ ═> │ Output  │
│ Transformer │    │ Rectifier   │    │         │    │             │    │         │
└─────────────┘    └─────────────┘    └─────────┘    └─────────────┘    └─────────┘
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INTERFACES COVERD:

- We have covered Arduino interface and code
- Memory Card and IOT module interface
- Voltage and current sensors interface
- RTC module DS1307 interface