Power Meter

Introduction

This project is done using Waterfall Model, in this document you can find:

1- Requirement analysis
2- High Level Design
3- Low Level Design

Requirement analysis

1- Two probes measure power, current and voltage.
2- Sending the values to mobile application.
3- Display the values with different units.
4- Setting maximum value using mobile application
5- If the reading value exceeds the maximum value a red led and a buzzer turn on other wise green led is on

High Level Design

Hardware Components

1- INA219 Sensor
2- Bluetooth module
3- 2 LEDs
4- Buzzer
5- Potentiometer (For Testing)

The Software will be layered Architecture software it consists of three layers:

1- Application Layer
2- ECUAL Layer (ECU abstraction layer)
3- MCAL Layer

Low Level Design

Software Components:

1) Application Layer

   Which contain several functions of the main logic:

   1.1- Initialize System.

   1.2- Read from the sensor.

   1.3- Check user input.

   1.4- Send via Bluetooth.

2) ECUAL Layer

   Which contains the required drivers for hardware components:

   2.1- INA219 diver

      Which contains some main functions:

      2.1.1- Initialize the sensor.

      2.1.2- Read bus voltage.

      2.1.3- Read current.

      2.1.4- Read power.

   2.2- BT-Module driver

      Which contains some main functions:

      2.2.1- Initialize the module.

      2.2.2- Send Data

2.2.3- Receive data with timeout (if the user doesn’t enter any input for period of time continue)

2.2.4- Receive data (stuck in while loop until user enter input data)

2.3- LED

2.3.1- Initialize the LED.

2.3.2- Turn On the LED.

2.3.3- Turn off the LED.

2.3.4- Toggle the LED

3) MCAL Layer

3.1- RCC Driver

3.2- GPIO Driver

3.3- TIMERS Driver

3.4- USART Driver

3.5- I2C Driver