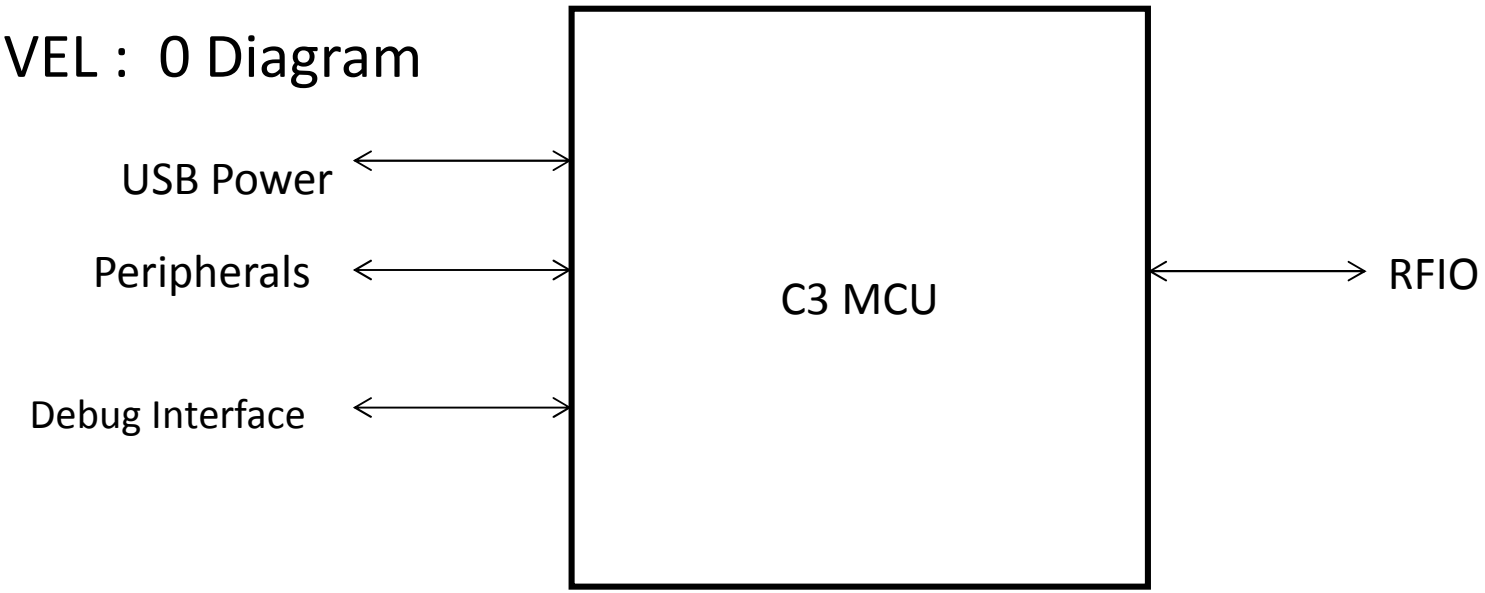
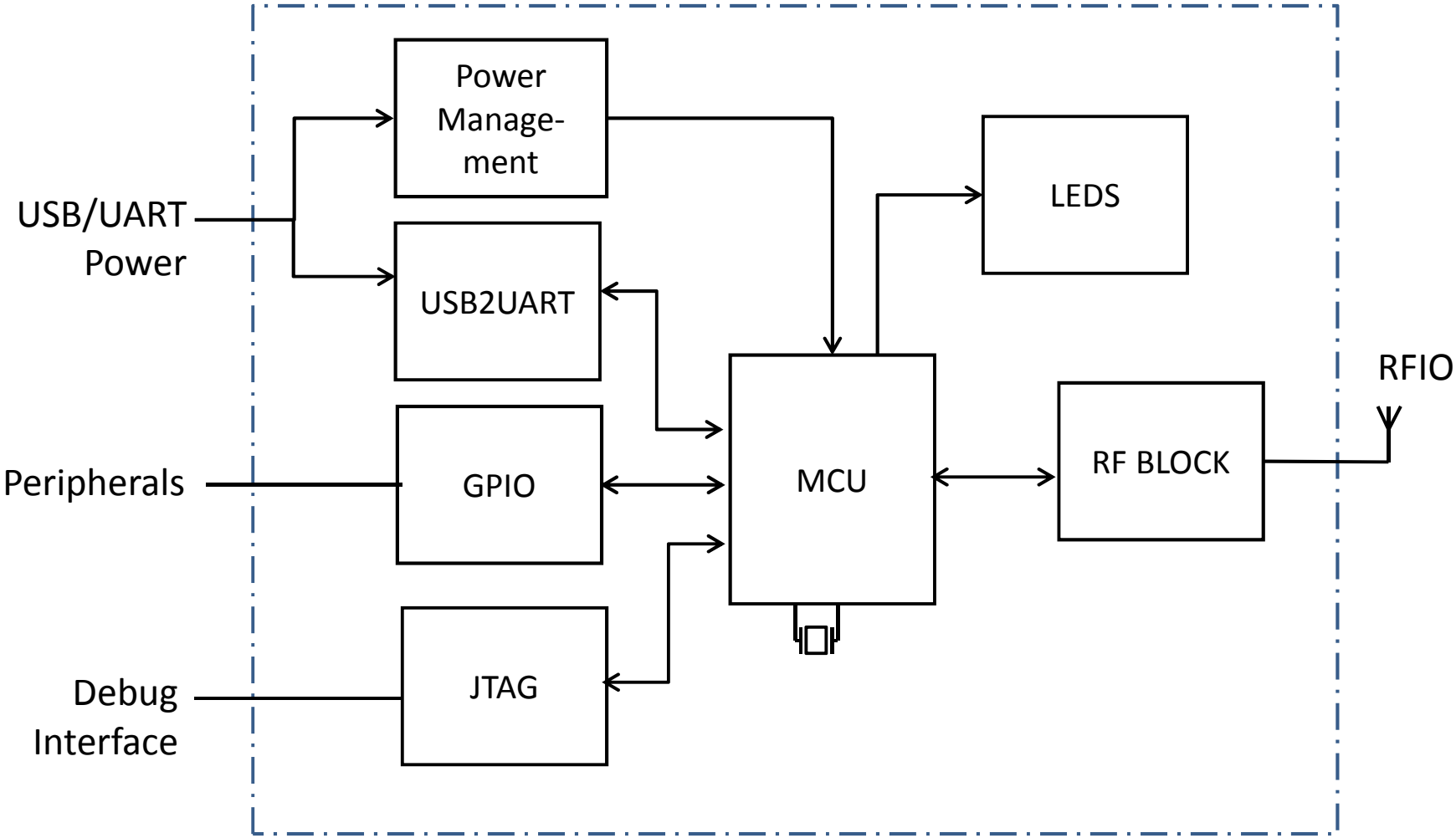
## LEVEL : 0 Diagram

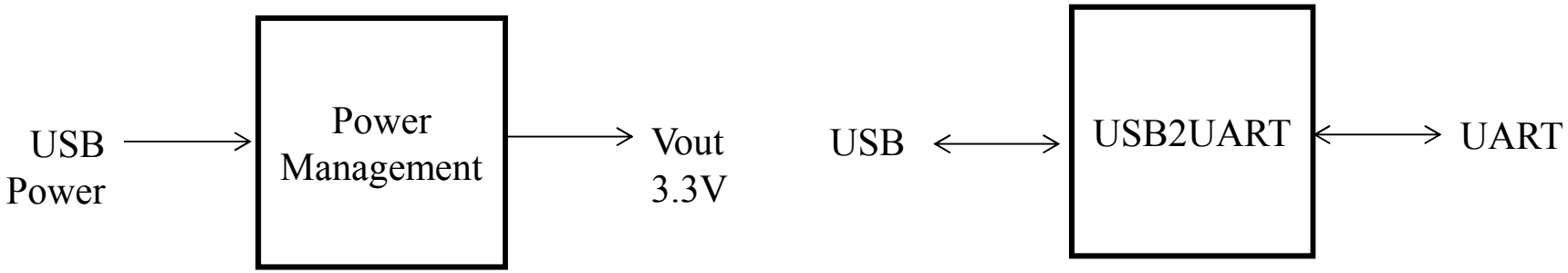



| **Module** | **C3 MCU** |
|---|---|
| Bi-directional (Input-Output) | 1) USB Power : supplies 4.5V-5.5V to the board and feeds data into and out of the system<br>2) Debug Interface : Debug with JTAG interface<br>3) Peripherals: Connection via GPIO to other components, for e.g. LEDs, audio-channel etc.<br>4) RFIO: Radio input-output channel at 436.5 MHz passband ; uses an antenna |
| Functionality | This module is a subsystem of a larger satellite CubeSat system. The main function of this subsystem is to receive and transmit high frequency data signal using Wi-Fi protocol. At the heart of this module is a microcontroller that takes commands via USB, GPIO, and JTAG configurations and uses radio frequency to communicate messages from and to another similar module. |

# LEVEL : 1 Diagram



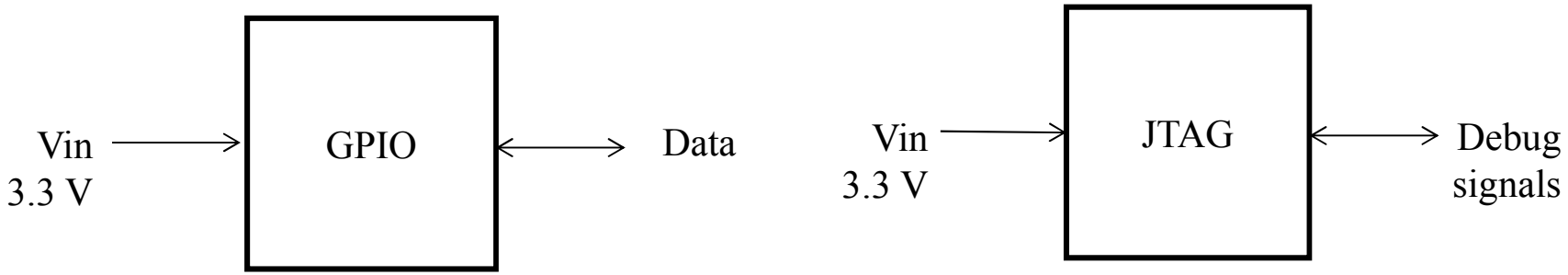
LEVEL : 0-1 Diagram




| **Module** | **Power Management** |
|---|---|
| Input | USB Power : supplies 4.5V-5.5V DC through USB connection |
| Output | Vout: Outputs 3.3 V DC |
| Functionality | The function of this unit is to manage the power system. It is powered through USB connection. It consists of voltage regulator and a battery pack that stores voltage and outputs constant 3.3V. |

| **Module** | **USB2UART** |
|---|---|
| Bidirectional (Input –Output)<br>Output | USB : Data via USB connection (D+ and D-)<br>UART: Data via UART (RX and TX) |
| Functionality | This unit consists of USB-to-UART Bridge controller that converts USB signals to RS-232 and vice-versa. |

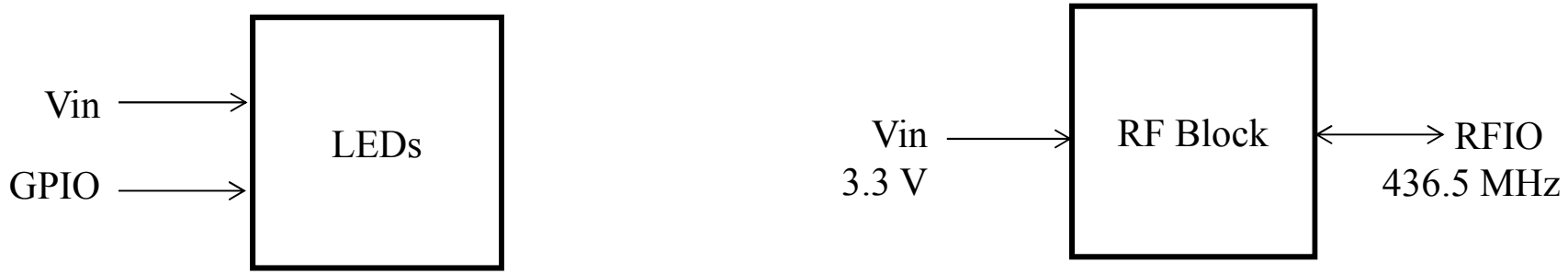
LEVEL : 0-1 Diagram




| **Module** | **GPIO** |
|---|---|
| Input | Vin: 3.3 V DC |
| Bi-directional (input-output) | Data: common channel for data in and out using GPIO connection |
| Functionality | This modules provides an interface between microcontroller units other peripherals. |

| **Module** | **JTAG** |
|---|---|
| Input | Vin: 3.3 V DC |
| Bi-directional (input-output) | Debug signals: Common channel to transfer data between microcontroller and environment. |
| Functionality | This consists of a 10-pin JTAG connector system that allows to debug the chip. |

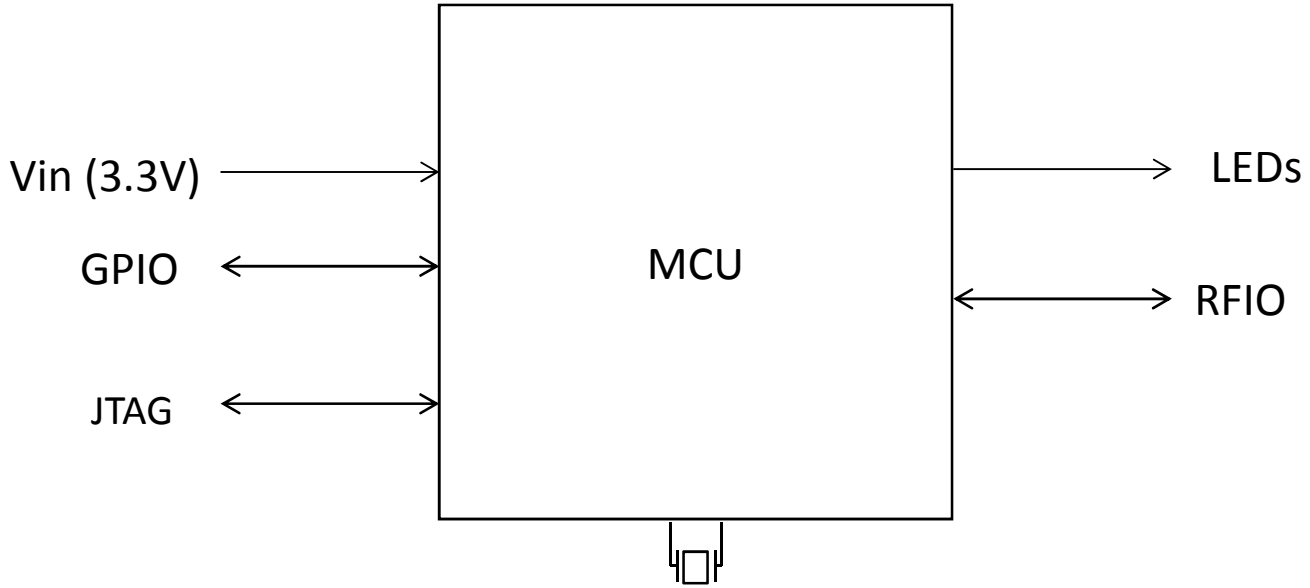
LEVEL : 0-1 Diagram




| **Module** | **LEDs** |
|---|---|
| Input | Vin: 3.3 V voltage supply<br>GPIO: GPIO pins connection |
| Functionality | It's function is to indicate a connection of a device. It consists of tri-color LED (RGB). The lights turn on or off when a device is connected or disconnected respectively. |

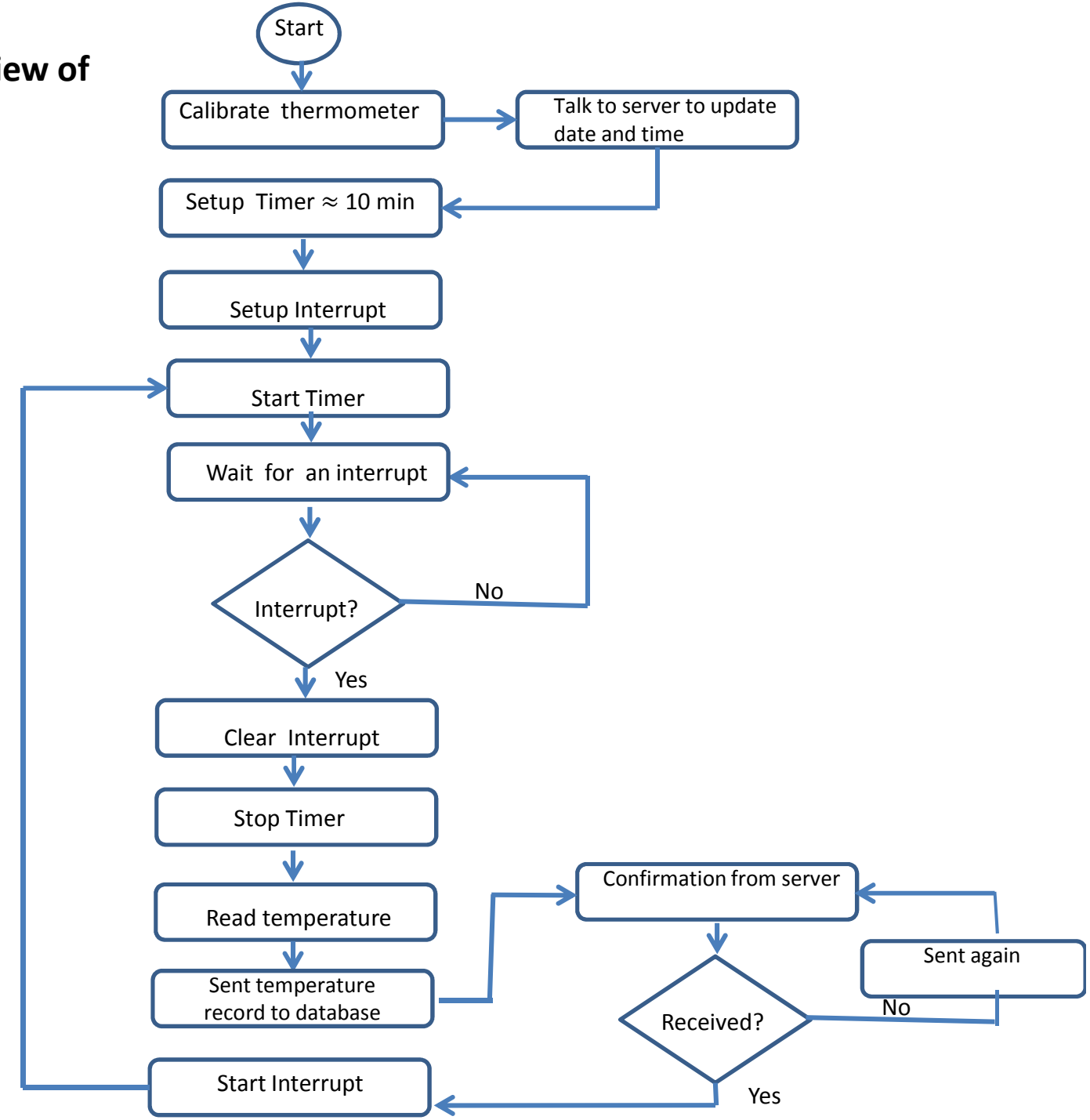
| **Module** | **USB2UART** |
|---|---|
| Input | Vin: 3.3 V supply |
| Bidirectional (Input –Output) | RFIO: 0-13dB power signals at 436.5 MHz |
| Functionality | The main purpose of this module is to receive and transfer radio signals at a passband frequency of 436.5 Hz. |

# LEVEL: 0-1 Diagram




| **Module** | **MCU** |
|---|---|
| Input | Vin: supplies 4.5V-5.5V |
| Output | LEDs : Tri-colored LEDs (RGB) |
| Bi-directional (Input-Output) | 1) GPIO: Connection to peripherals via GPIO<br>2) JTAG: connection to 10-pin JTAG interface<br>3) RFIO: Radio input-output channel at 436.5 MHz passband |
| Functionality | This is the main microcontroller unit in the system. It uses a real-time operating system.It has a resonator connected to it that clocks at 32MHz. This unit monitors radio signals, as well as provides multiple interfaces , for eg.GPIO, JTAG, SPI, I2C etc., to transmit and receive data. |

**UML State Machine View of Vaccine Temperature Monitoring**



**UML Sequence Diagram**
**View of Vaccine**
**Temperature Monitoring**