AIR CONDITIONER

INTRODUCTION

Air conditioning can be defined as the treatment of indoor air in order to control certain conditions required for human comfort. The desirable conditions may be temperature, humidity, dust particle level, odour level, and air motion.

REQUIREMENTS

- ### High Level Requirements

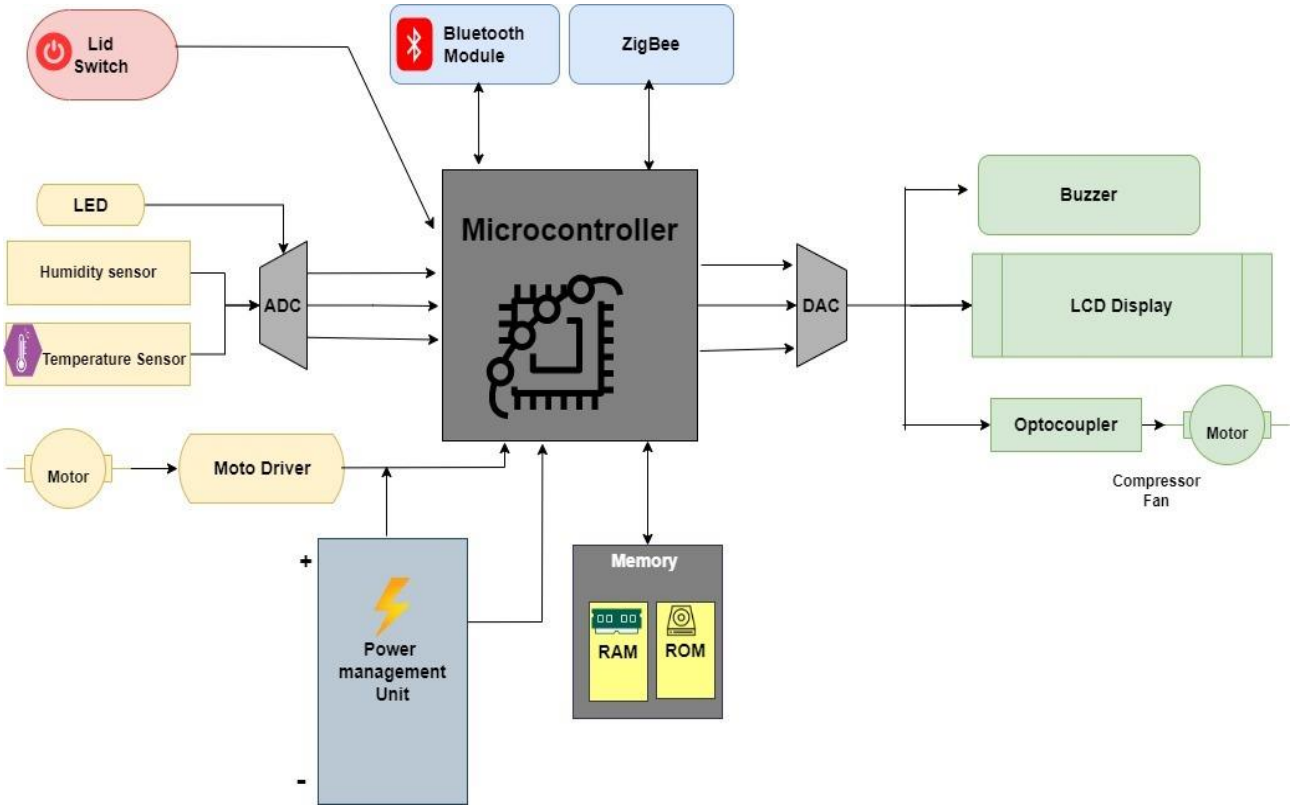
HLR(ID)	High Level Requirements
HLR01	Remote controls
HLR02	How accuracy the controller receives data
HLR03	Input power
HLR04	Connectivity
HLR05	Spontaneity output

- ### Low Level Requirements

LLR(ID)	Low Level Requirements
LLR01_HLR01	Temperature sensor
LLR02_HLR01	Humidity sensor
LLR03_HLR01	Input Motor speed
LLR04_HLR01	Led Blinking
LLR05_HLR02	Microcontroller

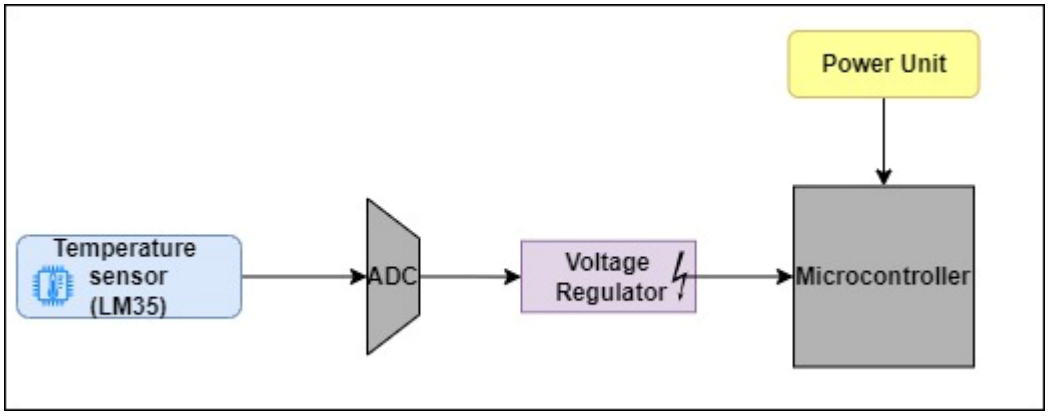
LLR(ID)	Low Level Requirements
LLR06_HLR03	Power Management
LLR07_HLR04	Bluetooth Module
LLR08_HLR04	ZigBee
LLR09_HLR05	Buzzer
LLR10_HLR05	Display(LCD)
LLR11_HLR05	Compressor

SYSTEM DESIGN

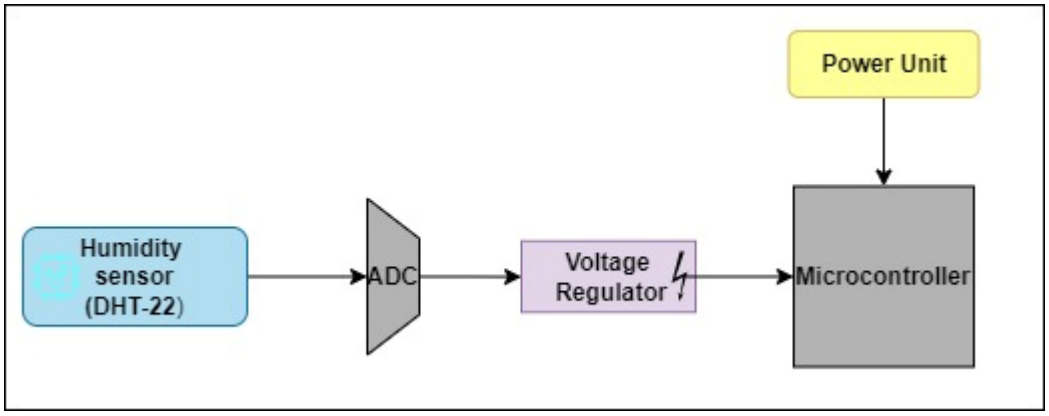


SUB - SYSTEM DESIGN

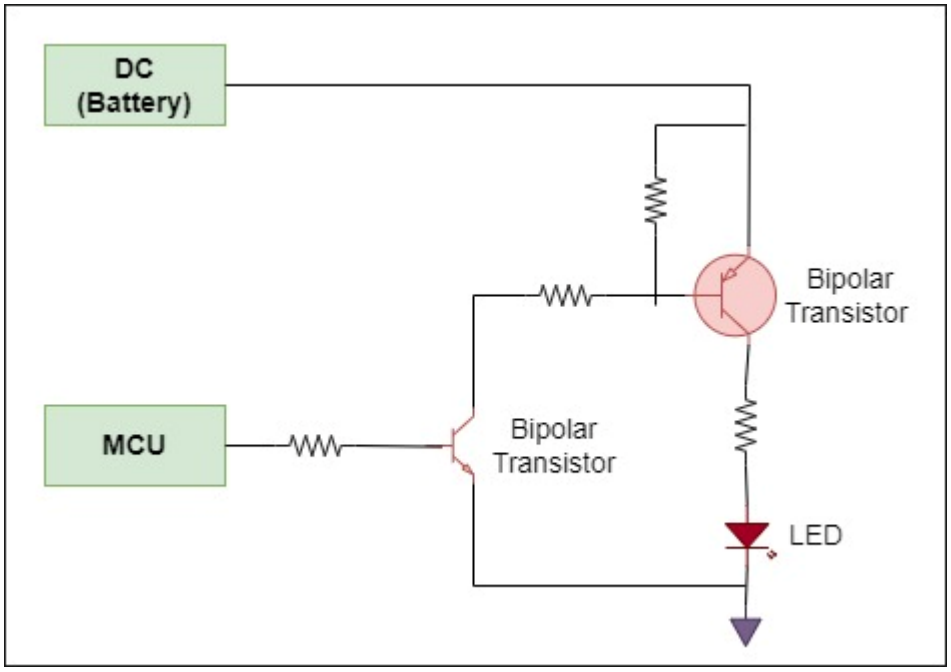
- *Temperature Sensor*



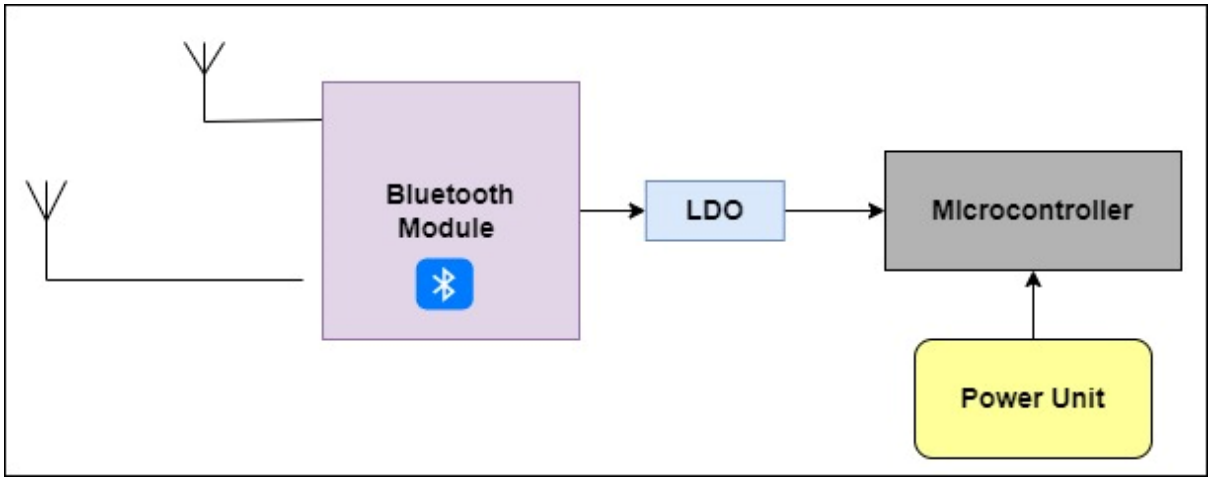
- *Humidity Sensor*



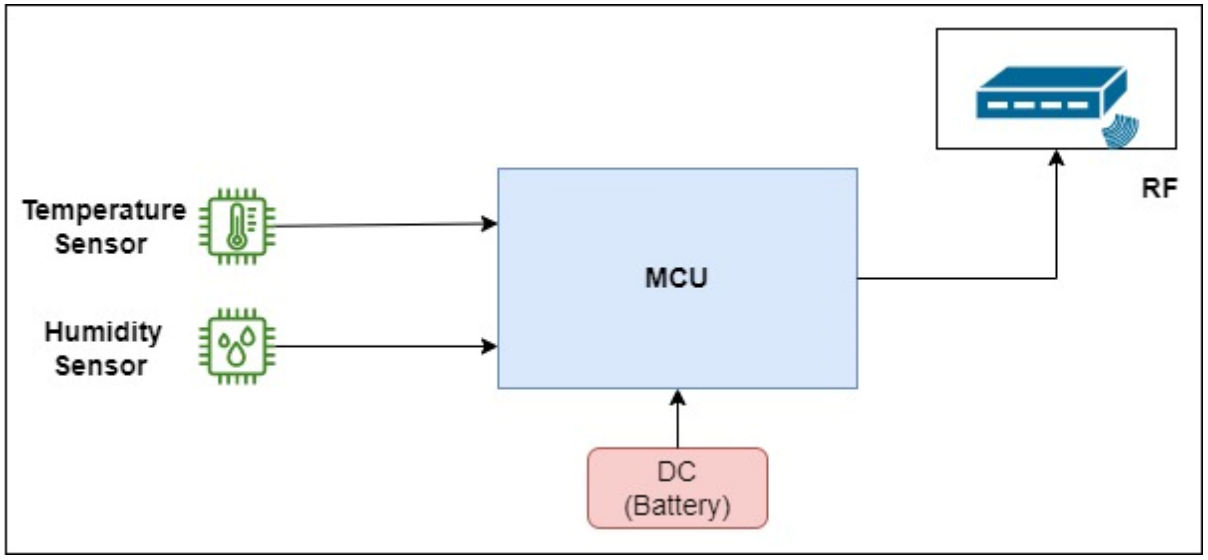
- *LED*



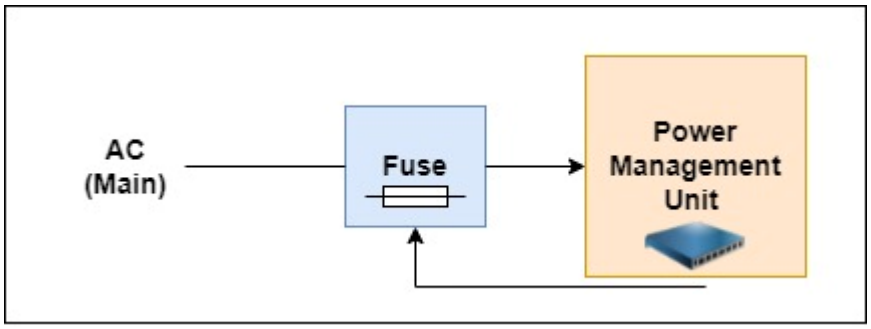
- *Bluetooth*



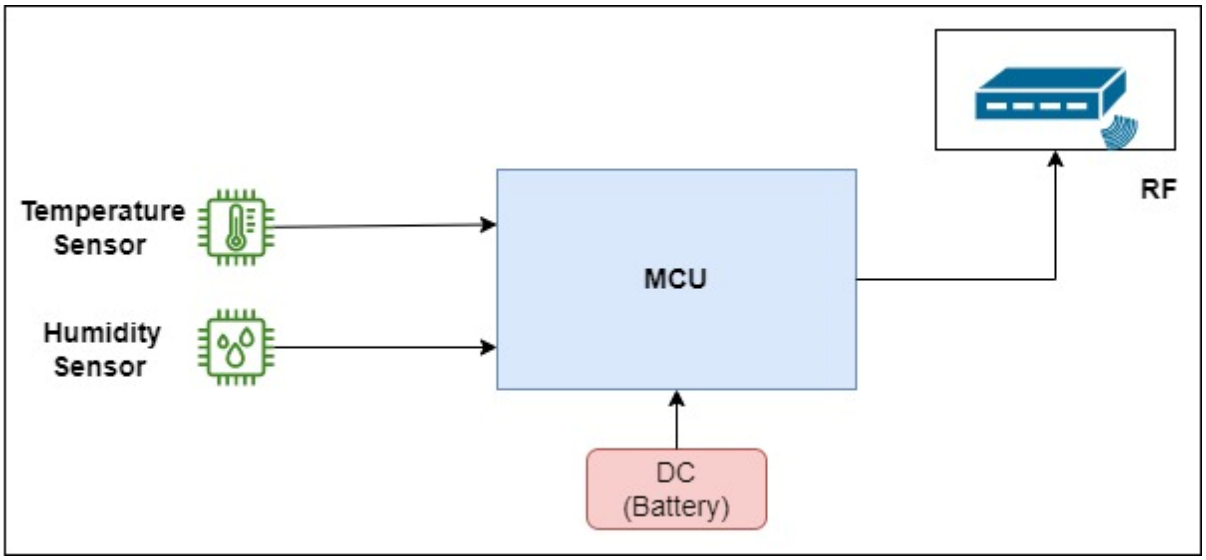
- *ZigBee*



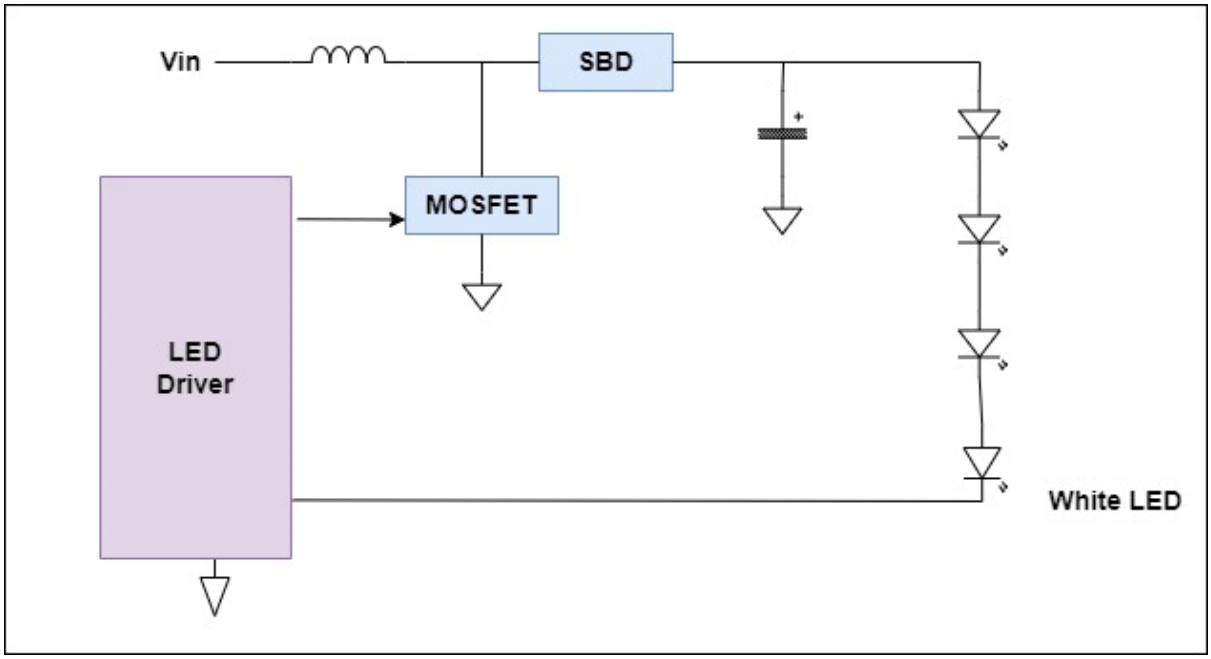
- *Power Management Unit*



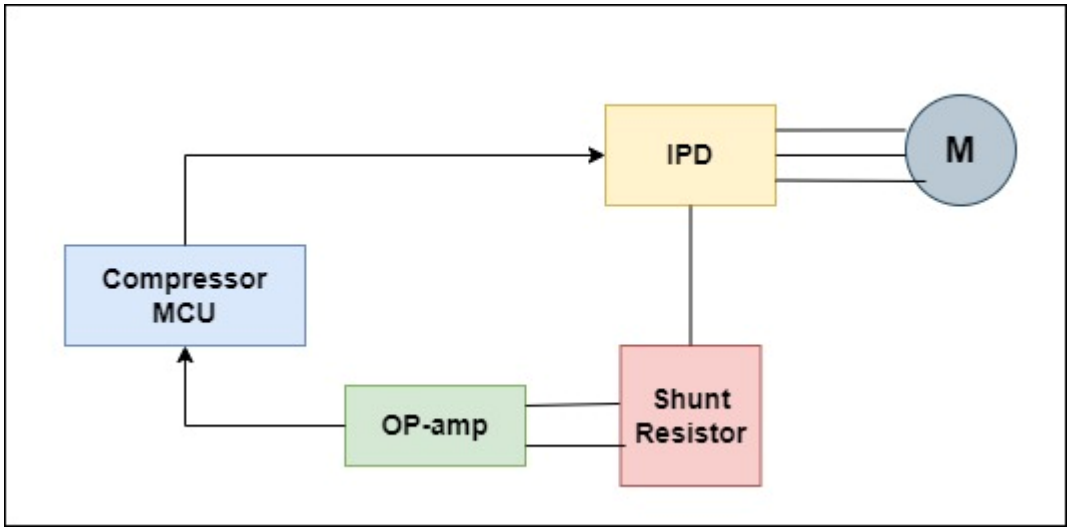
- *Buzzer*



- *LCD Display*



- *Compressor*



COMPONENTS DESCRIPTION

- *Microcontroller*

An integrated circuit that contains a microprocessor along with memory and associated circuits and that controls some or all of the functions of an electronic device (such as a home appliance) or system.

- *Bluetooth*

Bluetooth is an open wireless technology standard for transmitting fixed and mobile electronic device data over short distances.

- *ZigBee*

ZigBee is an open global standard for wireless technology designed to use low-power digital radio signals for personal area networks.

- *DAC*

Digital-to-Analog Converter (DAC) is a device for converting Digital signals into corresponding Analog signals.

- *ADC*

Analog-to-Digital Converter (ADC) is a device for converting Analog signals into corresponding Digital signals.

- *LCD*

LCD (Liquid Crystal Display) is a type of flat panel display which uses liquid crystals in its primary form of operation. LEDs have a large and varying set of use cases for consumers and businesses, as they can be commonly found in smartphones, televisions, computer monitors and instrument panels.

- *Octo-Coupler*

Opto-coupler is an electronic component that transfers electrical signals between two isolated circuits. Optocoupler also called Opto-isolator, photo coupler or optical isolator.

- *Motor*

a device that changes electricity or fuel into movement and makes a machine work

- *Memory*

Memory is an important part of embedded systems. The cost and performance of an embedded system heavily depends on the kind of memory devices it utilizes.

- *RAM*

Random access memory (RAM) is a computer's short-term memory, which it uses to handle all active tasks and apps. It is a hardware device generally located on the motherboard of a computer and acts as an internal memory of the CPU.

- *ROM*

ROM, which stands for read only memory, is a memory device or storage medium that stores information permanently. It is also the primary memory unit of a computer along with the random-access memory (RAM). It is called read only memory as we can only read the programs and data stored on it but cannot write on it.

- *Power Management Unit*

The PMU is a microcontroller, or integrated circuit, that controls the power functions of Macintosh computers. Though it is not a large component, the PMU contains several parts, including memory, software, firmware, and its own CPU.

- *Moto Driver*

The motor driver IC is an integrated circuit chip used as a motor controlling device in autonomous robots and embedded circuits.

- *Temperature Sensor*

A temperature sensor is a device that is designed to measure the degree of hotness or coolness in an object. The working of a temperature meter depends upon the voltage across the diode.

- *Humidity sensor*

Humidity sensors are electronic devices enabling you to measure the environment’s humidity and convert the data into a corresponding electrical signal that can be used for different purposes.

- *LED*

Light-emitting diode (LED) is a widely used standard source of light in electrical equipment. It has a wide range of applications ranging from your mobile phone to large advertising billboards.

SUB – SYSTEM TESTING

Test_ID	Sub-System Test Cases
TC01	Verify the functionality of the on/off button.
TC02	Verify if it's working in every temperature setting.
TC03	Verify the minimum temperature that can be achieved by the AC.
TC04	Verify the maximum temperature that can be achieved by the AC.
TC05	Verify LED is on or not and bulb Blink Or Not when Plug in.
TC06	Verify if the different AC fan speeds, work correctly.
TC07	Verify Humidity sensor in different climate change (Moisture, Dry).
TC08	Verify Bluetooth device range when it is highly covered (Remote).
TC09	Verify Bluetooth device range when it is partially covered (Remote).
TC10	Verify the response time between the AC remote and the AC.
TC11	Verify the Timer is working or not.
TC12	Verify Power Management unit status for high voltage.

Test_ID	Sub-System Test Cases
TC13	Verify Power Management unit status for low voltage.
TC14	Verify Buzzer when turned ON/OFF.
TC15	Verify the information Displayed in the display panel is correct or not.
TC16	Verify if the display isn't too bright or too dark.
TC17	Verify Compressor Motor Speed when High Voltage.
TC18	Verify Compressor Motor Speed when Low Voltage.
TC19	Verify that cooling in extra big size room.
TC20	Verify that cooling in extra small size room.

SYSTEM TESTING

TEST_ID	System Test cases
TC01	Verify the remote controls.
TC02	Verify how accurately Microcontroller receives data.
TC03	Verify Bluetooth, ZigBee connectivity.
TC04	Verify the Output response.