Phobos Description

I. Function description

1. Measurement of ambient temperature by temperature and humidity sensor;
2. Sense the presence or absence of human activity in the room through the PIR human body sensor;
3. Measure the battery charge through the ADC function of MCU;
4. Data transmission is realized by connecting the host computer with BLE5.0 Bluetooth provided by MCU;
5. Human-computer interaction is realized through touch keys and LCD display.

II. Description of the working mode

1. Pairing Mode

   If Phobos is powered on without being bound by the host, the default setting is Pairing Mode. At this time, the device enters the waiting pairing mode, and BLE broadcast is turned on for 5 minutes, waiting for the connection of the Bluetooth host; If there is no host connection within 5 minutes, then enter the Unpaired Mode.

2. Unpaired Mode

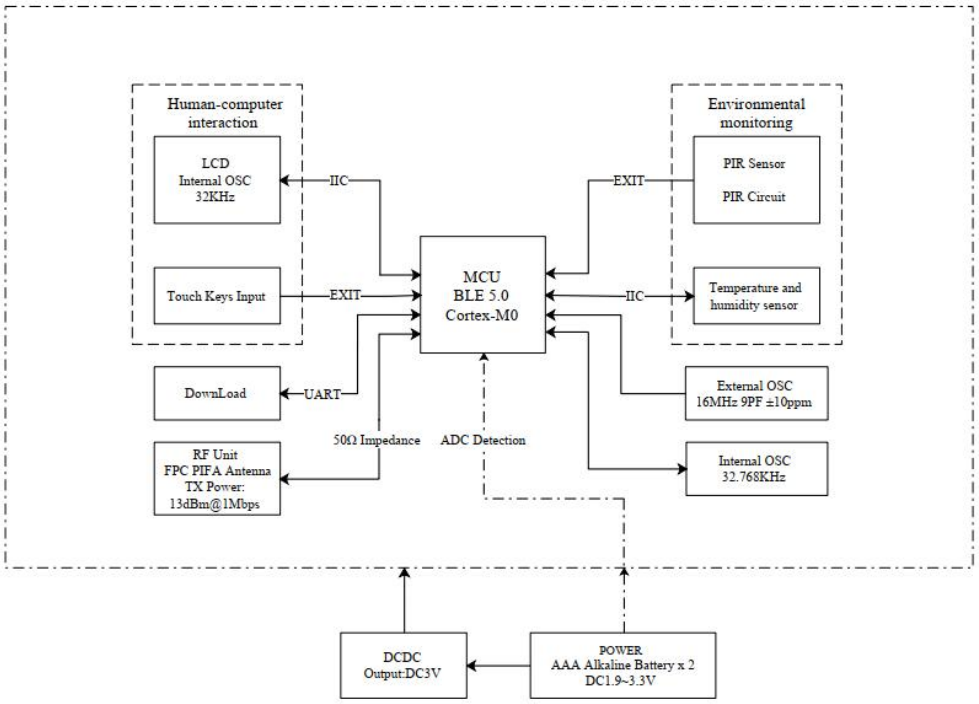
   If Phobos is not bound by the host when it is powered on, it will enter the Unpaired Mode after 5 minutes of Pairing Mode. At this time, the BLE function is turned off, but the temperature and humidity, PIR, electricity information, etc. are detected normally and the screen is displayed normally.

3. Thermo Paired Mode

   Phobos will enter Thermo Paired Mode after establishing a connection with the host. At this time, when the equipment detects the change of ambient temperature and humidity, PIR state, battery power and user-set temperature, it will upload the corresponding data packets to the host. If the above information is unchanged, the device will send heartbeat packet to the host every 10 minutes. At the same time, press and hold the two touch buttons on the housing for more than 6s to exit Thermo Paired Mode.

III. Phobos Block Diagram, The following figure shows:

Phobos Hardware Block Diagram



1. MCU

Model：CST92F25

Operating Frequency Range： 2400 ~ 2483 MHz

Channel Number： 3 broadcast channel， 37 data channel

Modulation Type： GFSK

Data Rate： 1Mbps

Antenna Information： FPC PIFA Antenna

Oscillator： External - 16MHz 9PF ±10ppm； Internal - 32.768KHz

Operating Voltage： 1.9V to 3.6V

Operating Current： Transmitter: 5.5mA@0dBm Tx power with DC-DC

Receiver: 5mA @with DC-DC

13μA@Sleep Mode with 32KHz RTC

2. PIR

Model：S19-L232W-2

Communication interface： External interrupt

Operating Voltage： 1.8V to 15V

Operating Current：3uA to 6uA

The PIR sensor uses an analog sensor, and after two-stage amplification and two-stage comparison, it outputs a high level or a low level to the external interrupt pin of the MCU, and the MCU displays the PIR status on the LCD screen. If Phobos is connected to the host at this time, this PIR information will be uploaded to the host.

3. Temperature and humidity sensor

Model：GXHTC3

Communication interface：IIC

Operating Voltage：1.6 V to 5.5 V

Operating Current：0.3uA@Sleep Mode

MAX 620uA@Working Mode

The temperature and humidity sensor uses IIC interface to communicate with MCU. MCU regularly reads the temperature and humidity data and displays it on LCD screen. If Phobos is connected to the host computer at this time, the temperature and humidity data will be uploaded to the host computer.

4．LCD

Model：VKL076

Communication interface：IIC

Oscillator： Internal - 32KHz

Operating Voltage：2.5 V to 5.5 V

Operating Current：MAX 20uA@3V Working Mode

MCU uses IIC interface to communicate with LCD driver chip, and controls LCD screen to display ambient temperature and humidity, PIR status, electricity information and Bluetooth status.