

AIOT Basic Kit

Overview

The AIOT Basic Kit is easy to use and flexible to handle numerous pre-built modules. Kit introduces a safe and easy connection of the kit's components by 2mm banana cables to 2mm safe banana plug. All modules are protected against reverse polarity connections. Users can install the required application components and connect between them easily. Kit's Main AIoT controller's GPIOs pins are accessible via 2mm banana plug for easy connection to the Kit's modules, The 2mm banana cable is stackable, so you can share the same Main AIoT Controller's GPIO Pins between more than one module



Specifications

Software Specifications:

Operating System for The Main IoT Controller :

- » Raspberry Pi OS (a Debian-based operating system for Raspberry Pi)
- operating system for Raspberry Pi)

IoT Local Server : Pre-installed lighttpd Web Server on the Main IoT Controller

PC Application : A web browser to access the IoT local services

Android Application : Android Applications

based on JAVA

Hardware Specifications:

Main AIoT Controller Based on Raspberry Pi 4 Model B :

- » **CPU :** Broadcom BCM2711 Quad core Cortex-A72 (ARM v8) 64-bit SoC @ 1.5GHz
- » **GPU :**
 - Broadcom VideoCore VI
 - H.265 (4kp60 decode), H264 (1080p60 decode, 1080p30 encode)

- OpenGL ES 3.1, Vulkan 1.0
- » **Camera:**
 - 8MP
- » **RAM :** 4GB LPDDR4-3200 SDRAM
- » **Wi-Fi :**
 - 2.4 GHz and 5.0 GHz IEEE 802.11ac wireless (Dual band)
 - backward compatibility to 802.11a/b/g/n
- » **Bluetooth :**Bluetooth 5.0, Bluetooth Low Energy (BLE)
- » **Ethernet :** Gigabit Ethernet 943 Mbps
- » **Ports :**
 - 2 x micro-HDMI 2.0 (up to 4Kp60 supported).
 - 4-pole stereo audio and composite video port.
 - 2 x USB 2.0.
 - 2 x USB 3.0.
 - 1 x USB-C.
 - Gigabit Ethernet.
 - Camera Serial Interface (MIPI CSI).
 - Display Serial Interface (MIPI DSI)
- » **I/O :** GPIO,UART,I2C,SPI,3 Channels ADC
- » **Storage :** Micro-SD card slot for loading operating system and data storage

Included Pre-built Modules

- **Input Modules :**
 - » **ADC Module 4 Channels 16 bit :** Interface I2C
 - » **PIR Sensor Module (Psd) :** Interface Digital
 - » **Joystick Module :** Interface Digital And Analog
 - » **DUST Sensor Module :** Interface UART
 - » **Thermistor Sensor Module :** Interface Digital And Analog
 - » **Humidity/Temperature Sensor Module :** Interface Digital
 - » **LM35 Temperature Sensor :** Interface Analog

- » **Water Sensor Module (Soil moisture) :** Interface Digital And Analog
- » **Flame Sensor Module :** Interface Digital
- » **Distance (UltraSonic) Sensor Module :** Interface Digital
- » **Light (CDS Photoresistor) Sensor Module :** Interface Digital And Analog
- » **Potentiometer Module :** Interface Analog
- » **Sound Sensor Module :** Interface Digital And Analog
- » **IR Receiver Module :** Interface Digital
- » **IR Reflective Module (Line trace):** Interface Digital
- » **Reed Switch Module :** Interface Digital
- » **Limit Switch Module :** Interface Digital
- » **Push Button Module :** Interface Digital
- » **Tilt Sensor Module :** Interface Digital
- » **Touch Sensor Module :** Interface Digital
- » **Vibration Sensor Module :** Interface Digital
- » **GY-87 (3-axis Gyroscope + 3-axis acceleration + 3-axis magnetic field + air pressure) sensor Module :** Interface I2C
- » **Shock Sensor module (knock) :** Interface Digital
- » **Gas sensor :** Interface Digital & analog

• Output Modules :

- » **Piezo buzzer Module :** Interface PWM
- » **Speaker Module :** Interface PWM
- » **LED Module :** Interface PWM
- » **RGB LED Module:** Interface PWM
- » **Relay Module:** Interface Digital
- » **Laser Module :** Interface Digital
- » **DC Motor :** Interface PWM
- » **Stepper Motor :** Interface Digital
- » **Servo Motor:** Interface PWM
- » **Vibration Motor:** Interface Digital

Optional Module

Code (IOT - 003.1):

- Arduino ADK Module
 - » Microcontroller ATmega2560

- » Operating Voltage 5V
- » Digital I/O Pins 54 (of which 15 provide PWM output)
- » Analog Input Pins 16 (of 10 bit ADC)
- » Flash Memory 256 KB of which 8 KB

- used by bootloader
- » SRAM 8 KB
- » EEPROM 4 KB
- » Clock Speed 16 MHz
- » Communication UART, I2C, SPI

Experiments

- Learning about different types of Sensors, Actuators, how it works and how to connect it to the main IoT controller for building the required application. up to 30 modules of different types of sensors and actuators used in our life.
- Learning about UART, I2C, GPIO , SPI communications, PWM and ADC.
- Learning the concept of IoT.
- Learning about Raspberry Pi and Python programming.
- Learning about Java programming of Android applications.
- Learning about how to make a basic control ,remote control and bluetooth communications.
- Learning about HTTP protocol and CGI.
- Learning about PHP programming and how to use it for remote control.
- Learning about HTML, JavaScript and how to use it for building user interfaces.
- Configuring the IoT Server and practice environment.

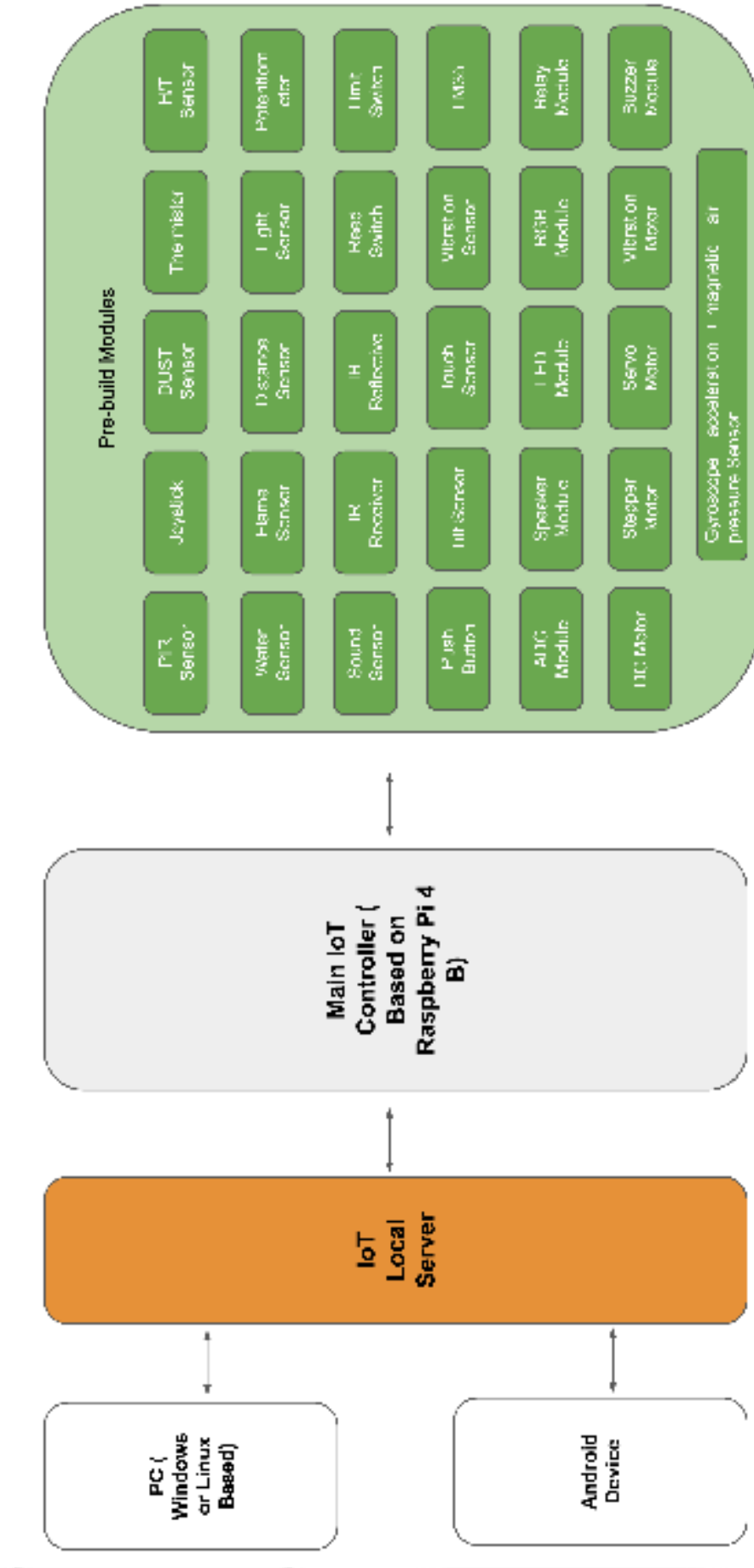
- Learning about configuration and usage of lighttpd Web Server
- Learning about how to build Android application to interact with the web server for remote control
- Learning about speech recognition and audio playback.
- Monitoring and saving sensors values as text, excel.
- Audio files playback, and output
- How to use google text to speech converter, google assistant
- how to use system modules (sensors, actuators, displays) to implement a wide range of experiments.
- learning about pandas, numpy, and matplotlib,.
- learning about supervised and unsupervised learning.
- learning about ANN, DNN, CNN.
- Learning about tensorflow

Scope of Delivery

- AIOT Basic Kit (IOT-003)
- Hard copy user manual

Options

- Digital Content (BI-01)
- Optional Module (IOT - 003.1)



Block Diagram