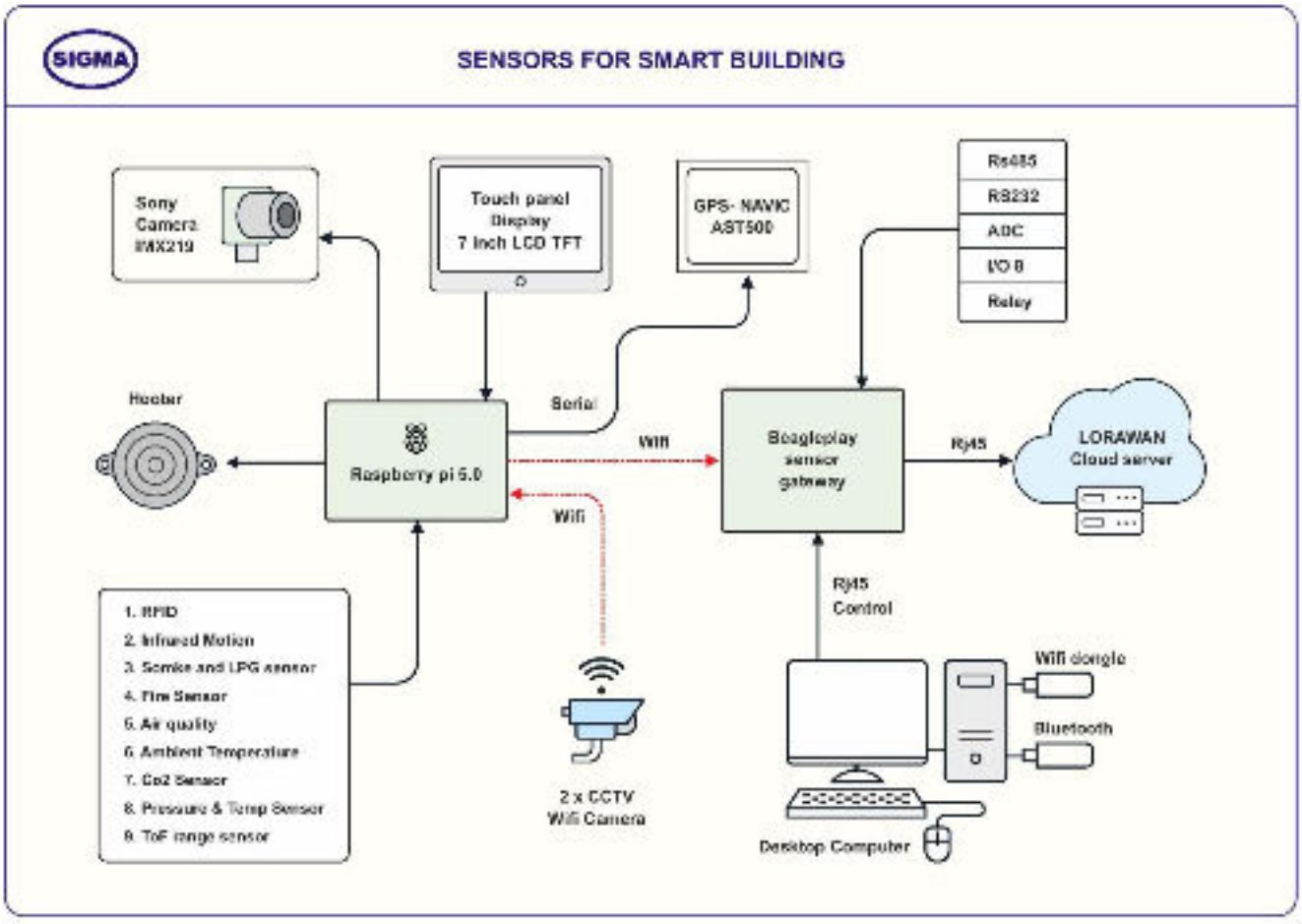
LORAWAN REALTIME APPLICATION TRAINER - LORAWAN SMART BUILDING

MODEL-LORASMARTBLDG100

SPECIFICATIONS



A. Main Specs

1. CCTV Camera, Motion Sensor, RFID, Smoke, Fire, LPG Gas, Air Quality, Ambient Temperature-Humidity, CO2, Light, Relays, Hooter, Touch Panel are provided.
2. Indigenously designed, developed GNSS System GPS, based on Make in India AST500 Chip Set based NavIC + GPS is provided for monitoring the location in the smart building.
3. Sensors Reading can well related in the Dashboard based on this GPS position.
4. Powerful ASIC Ultrasonic sensors are provided for the detecting the presence of persons for controlling the power to the Light, Fans etc.
5. Sensors should be designed and provided for Multi Level Smart Building.

B. Raspberry 5 Microcontroller

1. Processor Broadcom BCM2712 2.4GHz quad-core 64-bit Arm Cortex-A76 CPU, with Cryptographic Extension
2. 512KB per-core L2 caches, and a 2MB shared L3 cache
3. VideoCore VII GPU, supporting OpenGL ES 3.1, Vulkan 1.2
4. Dual 4Kp60 HDMI® display output with HDR support
5. 4Kp60 HEVC Decoder
6. 2 × 4-lane MIPI camera/display transceivers
7. PCIe 2.0 x1 interface for fast peripherals

C. CCTV Wireless Cameras : Xiaomi 360 – 2 Nos

1. For House Security, Recording, Remote Monitoring the office, work place.
2. 2K Pro with Bluetooth Gateway BLE 4.2
3. Dual Band Wi-Fi Connection
4. 3 Million HD 1296p| 3MP CCTV |
5. Full Color in Low-Light & AI Human Detection,
6. Compatible Devices ; iphone, Laptop, Smart Phone
7. Special Features : local Recording, motion sensing

D. Raspberry Camera Module : CSI Camera - Sony IMX219 8MP – 2 Nos

E. ARM53 Based Sensor Gateway – BeaglePlay Micro Controller

1. Based on 64bit QUAD Arm Cortex - A53, PRU and M4 microcontrollers
2. 5GHz, 2.4GHz and sub-1GHz wireless
3. Programmable Realtime Unit (PRU) Subsystem at up to 333 MHz
4. 2.4 / 5 GHz MIMO Wi-Fi
5. 2.4 GHz Bluetooth Low Energy and Zigbee
6. LoraWAN Coordinator
7. Single-pair Ethernet connectivity port with power over data line
8. 1 Gb/s Wired internet connectivity – RJ45 Port
9. Port to connect USB A Port devices like cameras, keyboard & mouse combos, etc
10. USB-C port for Power & Device Data
11. Full size HDMI port for connecting to external display monitors
12. JTAG debug port
13. Standard Bus I2C, SPI, UART
14. Termination for Hardware expansion.
15. 2GB (1Gb x 16)-1600 MHz – 3200 Mbps DDR Memory
16. Kingston 16GB eMMC Storage RAM
17. Power input with USB Type-C Port
18. Display - HDMI Type - A supports up to Full - HD / 1080P with 24-bit RGB
19. Support FPC 22 pin CSI and FPC 40 pin OLDI
20. Camera Serial Interface (MIPI CSI-2)
21. Linux OS with Drivers for all Wireless Connectivity

Add on Modules: -

1. TTL to RS485 Modbus Communication Slave Ports: 2 Nos
2. RS232 Port : 1 No
3. ADC Termination Point : 1 No
4. 8 Digital I/O Termination Point : 1 No
5. One Isolator Relay module : 1 No
6. One Xbee - Zigbee Coordinator : 1 No.
7. LoraWAN Coordinator Gateway – LPS08N : 1 No.

F. Navic - GPS gateway

1. Supports 32-tracking channel GPS- NAVIC-SBAS receiver with 26 channels for acquisition
2. Supports AGPS data input when interfaced to a cellular network through a GSM-GPRS modem
3. Outputs position, velocity and time either over the UART - Options available for data over SPI orI2C
4. Precise 1PPS pulse output synchronized to GPS / UTC time standard
5. Active and Passive antenna
6. Standard NMEA 0183 v4.11

G. Sensors

1. RFID : RFID Reader/Writer RC522

Voltage	: DC 3.3V (Do not use 5V supply)
Operating Current	:13-26mA
Idle Current	:10-13mA
Operating Frequency	:13.56 MHz

2. Hooter :

110 DB Hooter Security Alarm for Bank Loud Sound 110 DB Hooter Security Alarm for Bank Loud Sound

3. Motion Sensor : HC-SR501

Infrared Sensor with Control Circuit Board

The Sensitivity and Holding Time should be adjustable.

Blockade time: 2.5s (Default)

Sensitive Setting: Turn to Right, Distance Increases (About 7M); Turn to Left, Distance Reduce (About 3M)

4. Smoke Sensor and LPG Sensor : MQ2

High sensitivity to LPG, Propane, and Hydrogen

Long life and low cost

Simple drive circuit

Can be used as a digital or analog sensor

5. Fire Sensor :

Can detect the fire flame or the wavelength at 760 nm to 1100 nm

Test flame lighters distance of 80cm, the larger the flame, the greater the distance test

6. Air Quality sensor : MQ135

Sensitivity to Ammonia, Sulphide, and Benzene steam

With signal output instructions

The TTL output signal is a low level

Analog 0 ~ 5 v voltage output, the higher the concentration, the higher the voltage

7. Ambient Temperature : GY-BME280

Pressure and the temperature, but this sensor can also measure Humidity.

It uses both I2C and SPI (supports 3-wire, 4-wire SPI) interface

8. Co2 Sensor : MG811

Analog output

Two Range Options : 0 to 2V or 0V to 4V. The default is 0V to 2V DC

9. Pressure & Temp Sensor (capacitive MEMS sensor) : BMP585

Provides true absolute pressure and temperature, due to on-chip linearization and temperature-compensation

Low-noise 24-bit absolute barometric pressure sensor

300 hPa to 1250 hPa measurement range

Indoor navigation (floor detection, elevator detection) for smart multi level building

10. ASIC Ultrasonic level-Presence sensor : TOF

Ultrasonic Time-of-Flight (ToF) range sensor

Advanced ultrasonic signal processing using a high-end application-specific integrated circuit chip (ASIC)

The sensor is dust and water resistant on the front side

Level measurement in air

Std. operating range from 4 cm / 18 cm to 2 m

Water/dust protected chassis integration up to IP65/67 (EN60529)

Sample rate up to 50 samples / sec

11. Touch Panel :

7.0-inch, 800×480 pixels resolution, 262K colors, TV-TN-TFT-LCD

Capacitive touch screen

TTL / CMOS interface; 10Pin, 1.0 mm connection wire

Download via SD card or on-line serial port

H. Accessories

1. Ethernet Cable for Beagleplay : 1 No
2. Ethernet Cable for Raspberry Pi : 1 No
3. HDMI to HDMI Cable for Beagleplay : 1 No
4. HDMI to HDMI Cable for Raspberry Pi : 1 No
5. USB to square-type USB for XBEE : 2 Nos
6. 4 Port USB 3.0 Hub : 1 No
7. 5V, 3A DC USB-C Adaptor for Beagleplay : 1 No
8. 5V, 3A DC USB-C Adaptor for Raspberry Pi : 1 No
9. SD Memory Card with Codes for All Experiments : 32 GB - 1 No
10. 16 GB Pen Derive Software, Library, Drivers, Codes, Soft Copy of Manual & Mobile App
11. Printed Practical Manual : 1 No
12. E-Books for IOT Subjects : 10 Nos
13. Mp4 Video Class for IOT Subjects : 100 Nos
14. Power Supply : 230V AC, 50 Hz
15. Operating Conditions : 0-40 °C, 85% RH
16. Maintenance and Service Support : 1 Year

I. Computer

Desktop Computer	: Windows 11
CPU	: Intel core i5 - 13600k - 13th Gen - 14 Cores
HD	: 1TB SSD
RAM	: 16GB DDR4 RAM
WiFi and Bluetooth Dongle	
Display	: Monitor - 24” - LED
Keyboard	: TVSE Gold
Mouse	: Logitech 100
Software	: Google Map Software

This Computer is provided for hosting Cloud based software for smart transportation.

EXPERIMENTS

1. Test the functionality and coverage of the CCTV camera in different lighting conditions.
2. Evaluate the quality of video recordings and live streaming capabilities.
3. Monitor motion detection sensitivity using the Motion Sensor and adjust settings accordingly.
4. Test RFID tag detection and data reading with the RFID Reader/Writer RC522.
5. Conduct smoke and LPG gas detection tests using the MQ-2 Smoke LPG Butane Hydrogen Gas Sensor.
6. Test fire detection capabilities using the Fire Flame detection Sensor Relay Module.
7. Evaluate air quality measurements using the MQ 135 sensor and monitor pollutant levels.
8. Monitor ambient temperature and humidity levels using the GY-BME280-5V Temperature and Humidity Sensor.
9. Measure CO2 levels using the MG811 sensor and analyze indoor air quality.
10. Monitor pressure and temperature using the BMP585 sensor and track environmental changes.
11. Test the presence detection capabilities of the ASIC Ultrasonic level-Presence sensor (TOF) for controlling lighting and fans.
12. Evaluate the performance of the Touch Panel Smart Capacitive Touch Switch Board with light controls, fan control, and AC control.
13. Test the functionality of the 3 IR Channels for controlling IR appliances.
14. Evaluate the responsiveness and functionality of the 8 Capacitive Touch Buttons and 2 Digital Sensor Inputs.
15. Monitor and analyze data output from the sensors on the SMART Building Dashboard.
16. Test the integration of the GPS - Navic Gateway with the GNSS System GPS based on Make in India AST500 Chip Set for location monitoring.
17. Evaluate the performance of the Raspberry 5 and Beagleplay microcontrollers in handling sensor data and controlling devices.
18. Test the cloud-based software hosting capabilities with Computer provided.

Implementation Type : Real-Time