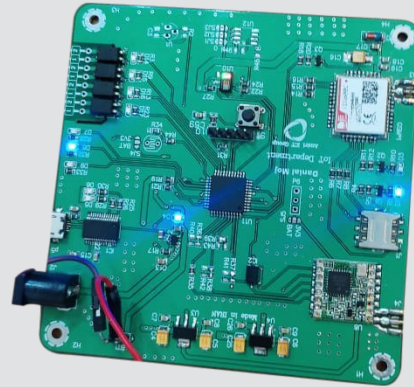# Holly Shrines

DESCRIPTION

This smart IoT-based hardware can be used in different remote guarding and monitoring applications. Taking advantage of cutting-edge communication technologies, and thanks to its precise and smart sensors, this hardware can replace human security guards and guarantees the safety of the protected place. This hardware measures the information about the temperature, humidity, smoke, light, movement, and vibration in the guarding place and sends any changes and unauthorized activities to the server and mobile applications. Also, this motherboard can be used in places with no internet connection thanks to its powerful low-power LoRa radio module which can communicate data with other similar nodes that are kilometers away.

List of components

- LoRa radio - RFM95W-433S2
- SIM800
- Smoke detector – MAX30105
- Accelerometer - ADXL345
- PIR module
- Temperature sensor - DS18B20
- Humidity sensor
- MCU - PIC18F46k40
- USB to serial - FT232RL
- Battery charger – MAX155
- Light sensor – LDR

MCU specifications

- Weight: 1.7g
- Speed: 64MHz
- Core Size: 8-bit
- Dimensions: 10 × 10 × 1 mm
- Base Product Number: PIC18F46K40
- Package: 44-TQFP
- Operating Temperature: -40°C ~ 85°C (TA)
- Voltage – Supply (VCC/Vdd): 2.3V ~ 5.5V

Smoke Detector sensor

- Tiny 5.6mm × 3.3mm × 1.55mm 14-Pin Optical Module
- -40℃ to +85℃ Operating Temperature Range
- Capable of Operating at High Ambient Levels
- Excellent Ambient Rejection Capability
- SPI protocol support
- 1.8V supply voltage
- Ultra-Low Power Operation
    - Programmable Sample Rate and LED Current for Power Savings
    - Ultra-Low Shutdown Current (0.7μA, typ)

Accelerometer

- Supply voltage range: 2.0 V to 3.6 V
- Ultralow power: as low as 23 μA in measurement mode and 0.1 μA in standby mode at VS = 2.5V (typical)
- SPI (3- and 4-wire) and I2C digital interfaces
- Free-fall detection
- Wide temperature range (−40℃ to +85℃)
- Full resolution, where resolution increases with g range, up to 13-bit resolution at ±16 g
- Single tap and double tap detection capability
- small and thin: 3 mm × 5 mm × 1 mm LGA package

PIR Module

- Supply voltage range: 4.5 V to 20 V
- Shutdown current: less than 50 μA
- Output voltage: 0 V/ 3.3 V
- Maximum detection range: 7m (max)
- Maximum angle: 120°
- Temperature range: -15℃ to 70℃
- Dimension: 24 mm × 32 mm

Temperature sensor

- Can be powered from data line. Power supply range is 3.0V to 5.5V
- Multidrop capability simplifies distributed temperature sensing applications
- Requires no external components
- Sensing Temperature: -55℃ ~ 125℃
- Accuracy - Highest (Lowest): ±0.5℃ (±2℃)
- Output Type: 1-Wire
- Operating Temperature: -55℃ ~ 125℃
- Thermometer resolution is programmable from 9 to 12 bits
- User-definable, nonvolatile temperature alarm settings

MAX1555

- Battery chemistry: Lithium Ion
- Number of cells: 1
- Charge current (Max): 340mA
- Battery pack voltage: 4.2V
- Voltage -supply (Max): 7V
- Interface: USB
- Operating Temperature: -40℃ ~ 85℃ (TA)
- Error protection

LoRa Transceiver

- Modulation: FSK, GFSK, GMSK, MSK, OOK
- Frequency: 433MHz
- Data Rate: 300kbps
- Power – Output: 14dBm
- Sensitivity: -148dBm
- Voltage – Supply: 1.8V ~ 3.7V
- Current – Receiving: 10.8mA ~ 12.1mA
- Current – Transmitting: 20mA ~ 120mA
- Operating Temperature: -20℃ ~ 70℃
- Serial Interfaces: SPI
- Dimension: 16×16mm

Sim800 GSM/GPRS module

- Frequency Bands: 850/900/1800/1900MHz
- GPRS multi-slot class: 12/10
- Supply Voltage: 3.4V ~ 4.4V
- Operation temperature: -40℃ ~ +85℃
- GPRS mobile station: class B
- Interface: USART
- GPRS class 12: Uplink/Downlink up to 85.6Kbps
- PBCCH support
- Embedded TCP/UDP protocol
- FTP/HTTP/POP3/SMTP
- (U)SIM card (1.8V/3V)