LoRa-based Camera Solution: Low Sampling Rate and Low-Resolution Monitoring

Sengital Limited
Last Updated: May, 2020
20 years+ Experience in:
1. Since 1999: Sensor Applications
2. Since 2001: Wireless Network (RF, ZigBee, Bluetooth, WiFi, BLE, LoRaWAN)
3. Since 2001: Firmware and Embedded System (4bit, 8bit, 16bit, 32bit MCU, ARM and Cortex Embedded system with Android, Embedded Linux)
4. Since 2002: Software, game, server, mobile app, CMS development
5. Since 2004: Consumer Electronics
6. Since 2009: Medical and Healthcare Products
7. Since 2010: Artificial Intelligence and machine learning
8. Since 2012: Augmented Reality and Virtual Reality

Professional Qualification:
1. Graduated from HKSTP Incubation Program
2. ZigBee Alliance Adaptor Member
3. Freescale Design Alliance Member
4. HKMHDIA Corporate Member
5. LSCM Corporate Member
6. HKEIA Corporate Member
7. HKETA Corporate Member
8. CAHK Full Member
9. ITJC member
Sengital’s Mission is to design products to improve human life by Innovation and Technology.
Publications

LoRa-based Camera System

Sengital Limited
LoRa-Based Low Power Slow Scanning Camera

1) Solar-powered module including solar panel and charger as well as battery system for LoRa-based camera
2) LoRa-based low power camera node supports low sampling frequency with a QVGA resolution image per hour
3) System health monitoring module for checking system health status and broadcast using LoRa
4) Low power consumption control to support system to be able to operate in a feasible time frame for maximum 7 days continuously without battery charging or under low solar intensity.
5) Image processing and compression algorithm to handle the image size control and image recovery due to packet lost causing by unstable environment

This is a concept image. The final product is different from this photo.

Sengital LoRa-Based Camera Module
LoRa-Based Camera Node System Design

1. Image Compression Algorithm (3 methods)
   - Camera module
   - MCU + LoRa module

2. Current and voltage sensor
   - Low power consumption LoRa module
   - SPI/I2C

3. Ambient light, temperature, humidity and pressure sensor data

4. Self Monitoring Module
   - LoRa WAN Server (GWIN)
   - Internet (MQTT)
   - Cloud server and DB

5. User friendly Server and Operator App with data analysis
   - Mobile and web/App
   - 4G-LTE
   - 4G-LTE

Solar powered LoRa Camera Module

Solar panel

Charger

Rechargeable battery

Power Supply

LoRa

LoRa gateway

4G-LTE

LoRa WAN Server (GWIN)

Cloud server and DB

Mobile and web/App

User friendly Server and Operator App with data analysis

User friendly Server and Operator App with data analysis

Solar powered module

Solar powered module

Solar powered module

Solar powered module

Solar powered module
Other IoT Sensor Kit

Sengital Limited
Introduction to IoT Sensor Kit

The objective of this IoT Sensor kit is to demonstrate the IoT sensor capability of our team with different sensors and different connectivity including BLE and Wifi as well as RFID, Wireless charging and solar power charging.

This kit can be used in technical training, STEM education, and feasibility study about IoT.

Price: by quotation
Availability: In stock
Introduction to IoT Sensor Kit

Size: 36*25*9.4CM
Component part:

• Polysilicon 5V6V250-300ma1.5W
• Solar panel *4
• 10000mAh Power Bank*1
• Micro Charging Cable*1
• TYPE-C Charging Cable*1
• Small Solar Panel Charging Module 5v Regulator
• 12V wireless charger transmitting terminal mode*1
• IoT Sensor: 6 different modules
Introduction to IoT Sensor Kit

Type of IoT Sensor:
- Wifi Environmental module
- Wifi Camera module
- BLE 3-axis accelerometer module
- BLE 6-axis motion sensing module
- Wireless charging BLE 6-axis motion sensing module
- BLE environmental module
- BLE RFID module
Introduction to IoT Sensor Kit

1. Wi-Fi/BLE Environmental module
   - 3MM Two-color LED and 3MM Tricolour LED
   - ESP32-WROOM-32D
   - Lithium-ion battery charger IC
   - 3.3V voltage regulator IC
   - Slide switch
   - Atmospheric pressure, temp, humidity sensor
   - 3.7V 600mAh Lithium-ion battery
   - Button*2
   - micro charging port

2. Wi-Fi Camera module
   - ESP32 Ai-Thinker
   - Button*1
   - 3.3V voltage regulator IC
   - TF card socket camera
   - FPC socket
   - PSRAM

3. BLE 3-axis/6axis motion sensor module
   - 3MM Two-color LED and 3MM Tricolor LED
   - Bluetooth IC
   - Lithium-ion battery charger IC
   - 3.3YM5 voltage regulator IC
   - Slide switch
   - High-precision digital triaxial/6axis sensor chip
   - 3.7V 200mAh Lithium-ion battery
   - TYPE-C charging port

4. BLE RFID receiver module
   - 3MM Two-color LED and 3MM Tricolor LED
   - Bluetooth IC
   - Lithium-ion battery charger IC
   - 3.3YM5 voltage regulator IC
   - Slide switch
   - RFID reader module
   - 3.7V 600mAh Lithium-ion battery
   - micro charging port
# Introduction to IoT Sensor Kit

## Environmental Sensor Specification

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relative humidity range:</td>
<td>0 to 100%</td>
</tr>
<tr>
<td>The temperature range is:</td>
<td>-40 °C to + 85 °C</td>
</tr>
<tr>
<td>Humidity measurement response time:</td>
<td>1S</td>
</tr>
<tr>
<td>Lag:</td>
<td>Relative humidity 2%</td>
</tr>
<tr>
<td>Pressure range:</td>
<td>300 to 1100 hPa</td>
</tr>
<tr>
<td>Absolute pressure accuracy:</td>
<td>Absolute value ± 1hPa (after welding)</td>
</tr>
<tr>
<td>Absolute temperature accuracy:</td>
<td>±0.5°C (When 25°C)</td>
</tr>
</tbody>
</table>

## Gyroscope Sensor Specification

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gyro Full Scale Range:</td>
<td>±250</td>
</tr>
<tr>
<td>Gyro Sensitivity</td>
<td>131</td>
</tr>
<tr>
<td>Gyro Rate Noise</td>
<td>0.005</td>
</tr>
<tr>
<td>Accel Full Scale Range:</td>
<td>±2</td>
</tr>
<tr>
<td>Accel Sensitivity</td>
<td>16384</td>
</tr>
</tbody>
</table>

## Accelerometer Sensor Specification

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accel Full Scale Range:</td>
<td>±2</td>
</tr>
<tr>
<td>Direction detection:</td>
<td>6D / 4D direction detection</td>
</tr>
<tr>
<td></td>
<td>Free fall detection</td>
</tr>
</tbody>
</table>
IoT Solution Portfolio

Sengital Limited
Motion Sensing Consumer Products
IoT for consumer electronics: Using sensors, 2.4GHz RF, MCU and software

Controller and Remote: Motion Sensing Technology

Sengital involved in multiple product development projects such as game controllers, TV remote and PC controllers for different customers and brands such as VRMS, i-too, PXN, BQT, eDimensional, Snakebyte, ICHONA, Futaba, IGUGU, Westinghouse and etc.

For detail information:
http://www.vrmsgame.com
http://www.kamtech.com.hk
http://www.IGUGU.com
http://www.wde.com

http://www.ichona.com/
http://www.futaba-rc.com/
http://www.snakebyte-europe.com
**Bee Station** is a wireless power socket which is connected by 2-ways 2.4GHz RF wireless communication. The Bee Station can be used to control the power of the home appliances.

**Bee IR station** is a wireless IR Remote station which receives the control command from RF module and then transmit the IR control command to the home appliances.

**The Bee Dongle** provides USB interface to connect to PC and transmit & receive the command signal between Bee Station / IR Station / or devices and PC.

With the Bee Control Panel, a **GUI software** provides a user friendly interface to user to control the Wireless Home Automation Network. Through the Internet, the Bee SIM dongle can be used to connect the Bee Control Panel to control the Wireless Home Automation Network.
Sengital has developed a DMX transceiver which won ICT Award and DMX512 is a standard for digital communication networks that are commonly used to control stage lighting and effect. Our Transceiver allows the console to send such commands to the device simultaneously. Data length, sampling frequency and communication frequency can all be adjusted.
Wireless Data Logger (for CEI – VOLTCASTR Brand)

- Complete system including Wireless
- 1) Temperature and Humidity Sensor, 2) Pressure Sensor,
- 3) Type K Sensor, 4) CO2 Sensor, 5)PC dongle, 6) PC software.
Global Tracking System - GSM-GPS based Tracking system

- Vehicle tracking module (Global Tracker)
- Dead reckoning module (Global Tracker DRM)
- Server system (Global Tracking Server)
  with web-based online fleet management portal (Global Tracking Portal).

Customers:

- Autotoll
- ARMY TRACK
E-Cert Readers and Dongle
IoT for Security: Using E-Cert, Sim card, MCU, Security, encryption and decryption

➢ Sengital extended the Technology in PKI:
  ● Invention of E-Cert applications:
  ● In 2006, we proposed and developed the eCertFile Drive, iBus Double, iBus Slim HKID card reader to E-Mice Solutions Limited (Operator of Hong Kong Post Office). Now HK Post Office and Hang Seng Bank is now using our reader for their E-Cert service.

➢ Sengital is now supplying the E-Cert USB Dongle to Bank of China (HK), Nanyang Commercial Bank, Chiyu Bank
This Product is an award winning product which is designed for Hong Kong Local school in order to help student to be more convenient to do the field study work. By using normal digital camera and PhotoGPS, student can take photos during field study and the PhotoGPS will help to log the location. By using the PhotoGPS software, the photo can link up with the location information logged by PhotoGPS. For more information, pls visit:

http://www.sengital.com/PhotoGPS/

Customers:
Hong Kong Schools
Large Scale Real-time E-sport Game

IoT for person: Using cloud, mobile app, AI, Game engine

Electrical and Mechanical Services Department

**E&M GO! 2018**

- Over 600 players to play in the same time
- Real time “e-sport” competition
- Mobile app and game system development
- Event on-site support

https://youtu.be/dfUC25bc63M
Sengital has developed an Android TV box for the brand called EasyTV (www.easytv.com.hk) which is selling in HK for local consumer market. By using Cortex A9 processor and Android 2.3 OS with customized hardware, firmware and software, EasyTV box provides very smooth and stable performance. By using Cortex A9 processor and Android 2.3 OS with customized hardware, firmware and software, EasyTV box provides very smooth and stable performance. With patented technology, EasyTV includes many user friendly features to make your user experience more enjoyable!
Sengital DigiTouch includes DigiTouch Touch Panel, DigiTouch Stick and DigiTouch Computer as well as the DigiTouch Presenter which adds on the existing TV to enable it to function as an Android Tablet but much bigger screen. For more information, pls visit: http://www.sengital.com/DigiTouch/
Besides the project for Corventis, Sengital also develops another patient monitoring system for Cyberonics.

On the other hand, Sengital is supporting many academic research projects in University. Details will be mentioned in University Research section.
Sengital has developed and is now developing a series of products for Remote Control Helicopter using sensors and wireless technologies for Conrad Electronics International (CEI) for their brands called Modelcraft and RCLogger.

Customers:

RC Logger

- 2.4 GHz TX Module
- 2.4 GHz RX Module
- 5.8 GHz Video TX Module
- 5.8 GHz Video RX Module
- 5.8 GHz LCD Display
- Power & RPM Module
- Orientation & G-Force Module
- Environmental Module
- 6iDoF Video TX Module
- 6iDoF Video RX Module
- 6iDoF LCD Display
- 6iDoF Power & RPM Module
- 6iDoF Orientation & G-Force Module
- 6iDoF Environmental Module
- 6iDoF 2.4 GHz RX Module
- 6iDoF 5.8 GHz RX Module
- 6iDoF 6iDoF RX Module
- 6iDoF 2.4 GHz TX Module
- 6iDoF 5.8 GHz TX Module
- 6iDoF 6iDoF TX Module
- 6iDoF 2.4 GHz LCD Display
- 6iDoF 5.8 GHz LCD Display
- 6iDoF 6iDoF LCD Display

Note: Some products may not be compatible with all modules. Please see the RC Logger user manual for more information.
Selected Customers

- sunflex
- iGUGU
- snakebyte
- GINS
- convertis
- Cyberonics
- RC Logger
- modelcraft
- VOLTCRAFT
- meva
- The Hong Kong Jockey Club
- FAT SHARK
- RC Vision Systems
- Autotoll
- ARMY TRACK
- IVE
- Mc CRYPT
- TRAFFIC
- EASY
- LITE STAR
- ACTION XL
- G PAD
- VRMS
- i-Too
- Ichona
- Antigiques and Monuments Office
- Hong Kong Museums
- HKDC
- HKPC
- The Education University of Hong Kong
- The Hong Kong Institution of Engineers
Any questions?
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