Agora – Develop, Deploy, and Maintain Devices Profitably

Garrett LoVerde | Embedded Planet
The Three Pillars of IoT

Connectivity
- Communication “pipeline”
  - Cellular
  - LoRa via gateway
  - BLE via gateway
  - Wi-Fi

Device
- Device identity / attestation
- Firmware updates
- Lifecycle management

Data
- Ingestion
- Storage
- Integration
The Three Pillars of IoT

The hidden pillar

Access Management

• Provides “Single Sign On” access to each of the pillars

• Adds simplicity to a complete IoT solution
Agora Connectivity Platform

PCB Populate Options
- Sensor Options
  - MIC
  - TEMP
  - HUM
  - PRESSURE
  - AIR Q
  - RANGE
  - S7021
  - ICM-20602
  - LSM9DS1
  - NL2200

- Connectivity
  - Cellular
    - CAT-M1
    - NB-IOT
    - GPS
    - LoRa
      - SX1276 NiceRF

SIM Options
- Nano SIM card
- ESIM

Antenna Options
- GPS
- NFC
- LoRa
- Cell

Application Processor
- Certified nRF2840 Bluetooth Module: Farnell BT840
- Features
  - Cryptocell
  - Cortex M4F
  - 256K RAM
  - 1MB Flash
- Connectivity
  - BT 5
  - 802.15.4
  - NFC

Standard Options
- Red LED
- NOR Flash
- User Button
- Power Switch
- Battery Monitor
- 1.8V - 5.0V Input

Tectonic Edge Connector
- ADC
- I2C
- GPIO
- DEBUG UART
- DEBUG SWD
- I2S
- QSPI
- USB

Common Cellular modem
- 20 Pin Footprint
- CELL USB
- CELL UART

Agora

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Agora Platform Component Diagram

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<tr>
<th>Component</th>
<th>Function</th>
<th>COLOR</th>
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<tr>
<td>Telit ME910C1-WW</td>
<td>Cat-M1 / NB-IoT / GNSS</td>
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<tr>
<td>TDK ICM-20602</td>
<td>Accelerometer - Gyro</td>
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<tr>
<td>NiceRF Lora1276</td>
<td>LoRa - 802.15.4 - &lt;Gig</td>
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<tr>
<td>BT840</td>
<td>MCU - BT5 - 802.15.4 - NFC</td>
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<tr>
<td>BOSCH BME680</td>
<td>Temp - Hum - Pres - Air Q</td>
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<td>ST7021</td>
<td>Temp - Humidity</td>
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<td>ST VLSI08X</td>
<td>Range Finding (ToF)</td>
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<td>ST LSM9DS1</td>
<td>Accel - Gyro - Mag</td>
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<td>TDK ICS-43432</td>
<td>Microphone</td>
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<td>Winbond</td>
<td>4MB QSPI NOR Flash</td>
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<td>RED LED</td>
<td>Indicator</td>
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<td>Nano-SIM Holder</td>
<td>Size 4FF</td>
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<tr>
<td>eSIM</td>
<td>Embedded SIM IC</td>
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<tr>
<td>Push Button</td>
<td>User button</td>
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<td>Power Switch</td>
<td>Slide Switch</td>
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<td>Battery Connector</td>
<td>JST</td>
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<td>Modem Connector</td>
<td>Common Footprint for Cellular</td>
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</tr>
</tbody>
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Flidor
Develop, Debug, Prototype

- SWD Debugger
- Support for SWO
- Serial -> USB from target
- Tectonic Plate board outline
- Breaks out all signals of Tectonic Edge to headers
- Fault Line adapter for vertically mounted boards
Rapid PoC Process

Introduction

1. Explore the problem
2. Gather the data
3. Refine the application
4. Demonstration Grafana Site: http://aiot.embeddedplanet.io/
5. Create an account to view dashboard
Rapid PoC Process

Explore the problem

- What *can* be measured?
- Refer to the reference platform (Agora) and see what it has that could solve your problem
Rapid PoC Process

Gather the data

- Deploy early and often
- DAQ-application – gather as many data points as necessary to fully characterize the problem
Rapid PoC Process

Refine the application

- Specialize the application to the problem
- Data consumption
- Power consumption
Rapid PoC Process

Phase 1 ·

DAQ-application to report IMU data:

1. Connect to the cell network
2. Register to Pelion
3. Read IMU data
4. Report to Pelion
5. Repeat steps 3 & 4 every 5 seconds
Rapid PoC Process

Phase 2 · ·

DAQ-application to report IMU data and calculated RPM:

1. Connect to the cell network
2. Register to Pelion
3. Read IMU data
4. **Calculate RPM**
5. Report to Pelion
6. Repeat steps 3-5 every 5 seconds
Rapid PoC Process

Phase 3 · · ·

Simple application to only transmit on a threshold breach:

1. Connect to the cell network
2. Register to Pelion
3. Configure the accelerometer Wake-on-Motion threshold
4. Sleep
5. Device spins and interrupt fires
6. Measure gyro readings, calculate RPM, and transmit
Silicon Partner: Cypress

- Connectivity Management
- Device Management
- Data Management
- Cortex-M
- CMSIS
-MBED OS

- MCU
- Radio
- PMIC
- Sensors

- Device Design
- Gateway Design
- IoT Integration Expertise
- Firmware
- Software Applications
- Production

- Product Integrators
- Innovators
Biblios

Next:
- Cypress PSoC 64
- Wi-Fi (2.4, 5 GHz)
- Improved security
- F-RAM storage
- Telit ME310G1-WW
Embedded Planet
Enabling Innovators and Integrators to make the Business Case for IoT

- We can help you every step of the way
- Problem Assessment
- Proof Of Concept – Measurement and iterative improvement
- Proof of Concept – Deployment
- Product finalization and deployment at scale
- OR
- Use our platform and do any/all of the development yourself using the 100% free development toolchain from Arm
Survey