Perceptive Edge

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Perceptive Edge

• Pushing intelligence to the edge of the cloud with sensing systems to move data quickly.
• Similar Architectural elements reused allows rapid innovation in design and development.
What problem are we trying to solve?

Too high! Takes an expert to install and then later reposition. It should be either less than 5%

Seriously! 75% of all calls are false positives.

Today
FMEA: Sensor Capabilities

Background: 108 Failure modes captured, Solutions for the top 50 issues fall in 19 common fixes.

Examples from “Better Sensor Design”:

- Tamper detection
- Enclosure Optimization
- Brown-out Detection
- Reliable Wireless
Data from Cambridge01 (Dining Room)

Motion when occupant is home

Bathroom visits
Sensing Suite

- **Agua Dulce**
  - Primer 3.0 + Arduino Shield
  - Interposer

- **Casa Alzate**
  - GPS Sensor

- **Punta Rocosa**
  - PIR + Shake Sensors

- **San Fellipe**
  - 3G cell phone

- **Pueblo Viejo**
  - LCD color

- **Santa Isabel/Camp Hill/High Hill**
  - Main Processor + WiFi + micro SD storage

- **Agua Mansa**
  - 3D Accelerometers + Gyros

- **Romellia**
  - Weather Board

- **Santa Catalina**
  - Energy saving Module

- **Southwest Bay**
  - DHS – Sensors (Dust, Air Quality, CO, CO2, Alcohol, Temperature)

- **Casa Baja**
  - TV

**Key Features**
- A very powerful and easy to use development environment
- FCC certified RF stack.
- C style development language
Home Energy Monitoring

IL Usage of the Providencia Suite

- Home energy team asked us to redesign their system to fit with Providencia Suite.
- Sensor detects appliance usage throughout the entire house with a two units.
- 100-500 household trial start in 2012 with Santa Catalina and Camp Hill
Normal Rig  Flexure mode to be avoided

RF Stack 802.11
6 DOF System

3 packs of 1S6P batteries
O-ring
Offshore Weather

- Remote buoys contain sensors to monitor sea traffic, weather conditions and localized current changes.

- Data used to monitor environmental conditions and potential damage to the local ecosystem from shipping.

- Simple sensor system architecture allows the sensors to speak directly to the cloud, and be monitored remotely.
Made for security purposes, connected to a wired interface or wireless. If wired will use the battery for backup or if tampered with while in-situ. Shake sensors used for large gross movement and tampering.
First Responder Application - Fireball

Metal Fireball capsule for extreme conditions
Water Quality

18 vectors of water quality for wells and reservoir.
B.Tag Overview

BTAG is short for Brazil-Tag, and is a battery-assisted RFID Tag for use by the government of Brazil for Automatic Vehicle Identification (AVI). The tag supports a limited set of the EPC C1G2 RFID protocol, and the full SINIAV Protocol which is a superset to EPC C1G2.

A key asset to the BTAG platform is its high level of security and cryptographic protection. This asset will allow extension of the BTAG platform described in this document to other potential “High-Security RF Identification” scenarios.
Gas Station of the Future

• BTAG is in the car and the readers are mounted over head

• Tag is read and car identified, displays at the pump show the customer deals and specials in the station
Displays for GSOF
Readers and Positioned
Size of the Mass of Data

<table>
<thead>
<tr>
<th>Category</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Home Energy</td>
<td>100 MB/day</td>
</tr>
<tr>
<td>Structural Monitoring</td>
<td>311 MB/Day</td>
</tr>
<tr>
<td>Air Quality</td>
<td>112 MB/Day</td>
</tr>
<tr>
<td>Fireball</td>
<td>10 MB/1.5 min</td>
</tr>
<tr>
<td>Water Quality</td>
<td>130 MB/day</td>
</tr>
<tr>
<td>BTAG</td>
<td>8,600 MB/day</td>
</tr>
</tbody>
</table>

With the size of the data, and the movement the shortest path needs to be the least number of hops as possible.

Manageability will be the key in the future.
Conclusion

• Flexible modular platforms are easiest to get first to market advantage.
  – Regulatory and qualification drive the modularity
  – BOM/Cost reduction post market entry
• Total Cost of ownership should be the focus of the design.
  – Sense what you should not what you can.
  – Accuracy of the data ensures the system becomes trusted
• The volume of information moving from the sensors in the environment will be the next exponential growth in computing.
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