On-River Tracking System for NOC Boats

Problem Statement
- Develop an inventory tracking system for the boats at the Nantahala Outdoor Center (NOC).

Requirements

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<tr>
<th>#</th>
<th>Requirement Description</th>
<th>Description</th>
<th>Iteration</th>
<th>Requirement Tag</th>
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<tbody>
<tr>
<td>1</td>
<td>Network Connectivity Performance</td>
<td>Network must operate in local area of service.</td>
<td>Demonstrable</td>
<td>Fundamental</td>
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<td>2</td>
<td>User Friendly</td>
<td>Interface should be able to use and understand the system well.</td>
<td>Demonstrable</td>
<td>Interface</td>
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<td>3</td>
<td>Compatibility</td>
<td>System should work with current mobile devices, iPods, and Androids.</td>
<td>Demonstrable</td>
<td>Interface</td>
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<td>4</td>
<td>Security</td>
<td>Network access should be restricted to authorized personnel.</td>
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<td>Interface</td>
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<td>5</td>
<td>Network Capacity</td>
<td>A network capable of 5 to 10 years of usage.</td>
<td>Demonstrable</td>
<td>Functional</td>
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<td>6</td>
<td>GUI Design</td>
<td>Network must be able to operate in local area of service.</td>
<td>Demonstrable</td>
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Concepts
- There were three initial concepts
  1. Use the built in Seeonic cellular networking capabilities by making use of the services provided by Hologram. This company has designed its network specifically for IoT M2M low power communications.
  2. Integrating the RFID tags on each boat into a network that will span from the NOC main campus to 8-miles up the Nantahala river, terminating at the put-in location.
  3. Introducing a serial RS232 WIFI adapter. The RS232 adapter will be an accessed point from the Seeonic Reader to the Server.
- Based off previously purchased material and other hardware issues the group decided to pursue concept 3.

Final Design
- Built an android application to enable android based Alien handheld RFID reader to scan tags into the PostgreSQL database through a cellular or Wi-Fi network.
- Implemented Amazon Web Services to deploy a PostgreSQL database using Amazon RDS and DreamFactory on a EC2 instance for API management.
- The endpoint for viewing data is a Microsoft Excel spreadsheet; there is a tab for viewing all tag scans, a tab for seeing the location of individual boats in the fleet and how many trips they have logged, and finally a summary tab showing how many boats are currently at each location.
- Seeonic reader will interface through a RS-232 to WiFi adapter (STA) and link to another WiFi adapter connected to the PC (Access Point).
- Data from tag scans picked up by the Seeonic will be transmitted from the STA to the AP, delivering that information to the user’s PC.
- The final approach of the Seeonic Reader will consist of a custom GUI that allows automatic antenna scan, data transfer to the server, and serial port communication of devices.

Results
- Data collected from scanning tags:
  - Where each individual boat is located:
  - Quantity of boats at each location:

Summary
- Seeonic tag scans will be wirelessly transmitted from the stationary device to the access point.
- A GUI for the Alien handheld reader will transmit data to a server.
- A GUI for the Seeonic reader will also transmit data to the server.
- Excel is endpoint accessing the inventory data.

Team & Acknowledgements
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