On-River Tracking System for NOC Boats

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Problem Statement

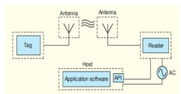
- Develop an inventory tracking system for the boats at the Nantahala Outdoor Center (NOC).

Requirements

Number	Requirement Description	Description	Verification	Requirement Type
1	Network Connectivity Interference	Network must operate in a poor area of services.	Demonstration	Performance
2	User Friendly	Employees should be able to use and understand the system with some training	Demonstration	Interface
3	Compatibility	Must be able to use Mobile network, RS232 WIFI Adapter, and RFID Network	Demonstration	Interface
4	Security	Network and servers should be accessible to NOC only	Demonstration	Interface
5	Network Longevity	A network span of 3 to 5 years of usage	Inspection	Functional
6	WIFI Range	Must ensure internet availability at put-in location	Inspection	Functional

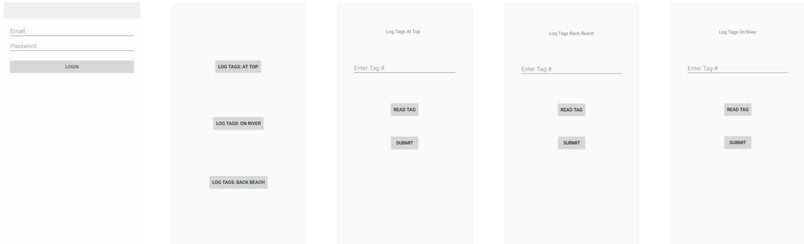
Concepts

- 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 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:

	A	B	C	D	E	F	G
1	id	tag	timeattop	timeonriver	timebackbeach	Trips	CurrentStatus
2	1	101	2/23/2021 14:14				At Top
3	2	101	2/23/2021 14:14				At Top
4	3	102	2/23/2021 14:19				At Top
5	4	103	2/23/2021 14:23				At Top
6	5	00000000000000000000500	3/1/2021 13:18				At Top
7	6	00000000000000000000500	3/11/2021 12:41				At Top
8	7	3535523	3/16/2021 14:08				At Top
9	8	1234567 8			3/18/2021 13:40		Back Beach
10	9	31321			3/18/2021 13:41		Back Beach
11	10	313		3/18/2021 13:42		1.00	On River
12	11	313	3/18/2021 13:46				At Top
13	12	00000000000000000000002	3/18/2021 14:51				At Top
14	13	00000000000000000000002	3/18/2021 14:51				At Top
15	14	00000000000000000000070	3/18/2021 14:51				At Top
16	15	00000000000000000000002	3/23/2021 14:01				At Top
17	16	00000000000000000000002		3/25/2021 13:36		1.00	On River
18	17	00000000000000000000002		3/25/2021 13:53		1.00	On River
19	18	00000000000000000000002		3/25/2021 13:58		1.00	On River
20	19	00000000000000000000002			3/25/2021 14:04		Back Beach
21	20	00000000000000000000002	3/25/2021 14:04				At Top
22	21	00000000000000000000002		3/25/2021 14:04		1.00	On River
23	22	00000000000000000000002	3/25/2021 14:14				At Top
24	23	00000000000000000000002		3/25/2021 14:14		1.00	On River
25	24	00000000000000000000002			3/25/2021 14:15		Back Beach
26	25	00000000000000000000002		3/27/2021 17:37		1.00	On River
27	26	00000000000000000000002		3/27/2021 17:39		1.00	On River
28	27	00000000000000000000046		3/27/2021 19:03		1.00	On River

- Where each individual boat is located:

	A	B	C	D
1	boatNumber	tag	trips	Status
2	1	00000000000000000000002	8	Back Beach
3	2	00000000000000000000046	2	On River

- Quantity of boats at each location:

	A	B
1	Status	Quantity
2	On River	1
3	Back Beach	1
4	At Top	0

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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