RFID ASSET MANAGEMENT SYSTEM

TEAM 35

- Kurt Burroughs – Computer Engineering

- Paco Patag – Electrical Engineering

- Rainor Tangvald – Electrical Engineering

PROBLEM

Asset management has always been a challenge. Whether it's pockets, lists or wrist straps, we've always come up with innovative ways to keep track of our items. As our technology has progressed and our daily items have become more valuable, it's also become far more anxiety-inducing to lose critical tools.

How can we manage these increasingly valuable items in a method that is scalable, intuitive, and cost-efficient?

SOLUTION

RAMS (RFID Asset Management System) uses UHF RFID technology to track the presence of a set of tagged items.

UHF technology works with passive RFID tags, which are small and thin enough to be attached like stickers to items, as well as being inexpensive enough (~$0.05/ea) to make adding items to the system a trivial cost. UHF also has the longest range of non-active RFID systems, with this system reaching a range of 15 ft in its current configuration. The RAMS device has an intuitive interface, making it easy for users to check items in and out, and track the movement of their gear.

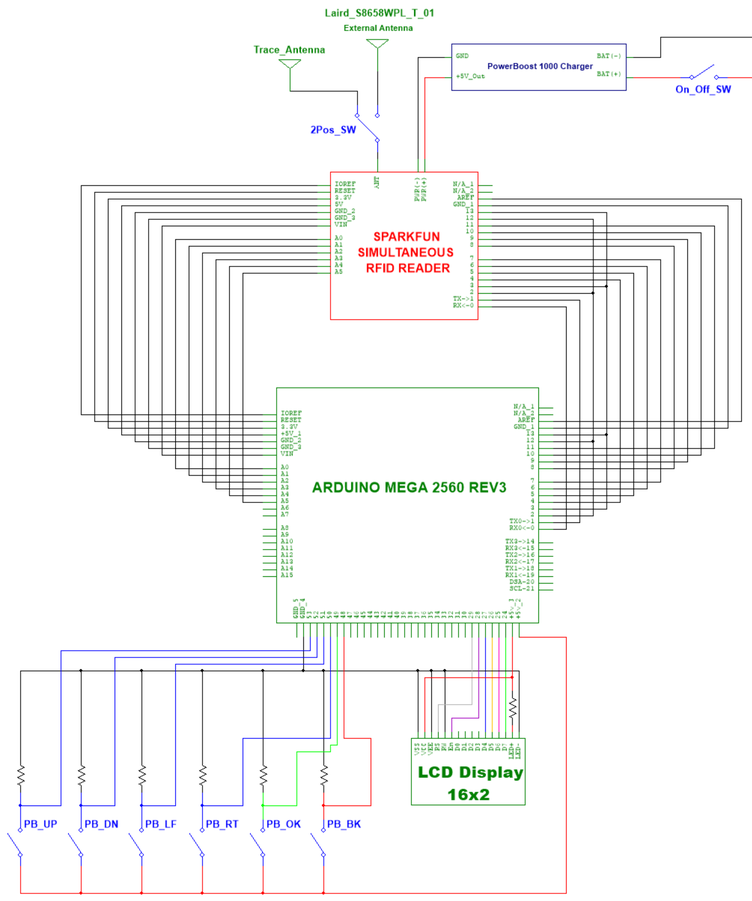
In completed form, RAMS assists users of any background in keeping track of their most important possessions.

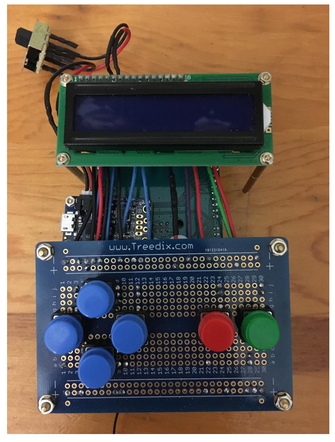
CONCLUSION

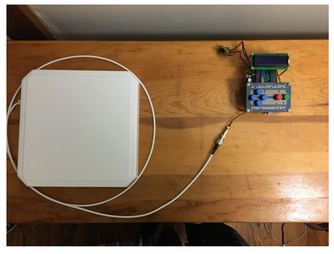
Though the project was unable to be fully completed due to complications related to COVID-19, a vast majority of the initial vision was completed: A functioning battery-powered UHF RFID asset management system was built.

Given further opportunity and resources for development, it is reasonable to expect that product goals such as a backpack-sized system and a companion smartphone app could be realized.

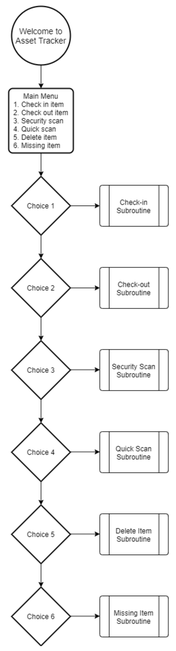
DESIGN



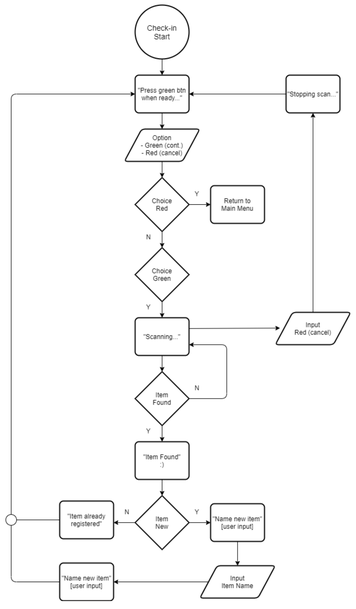




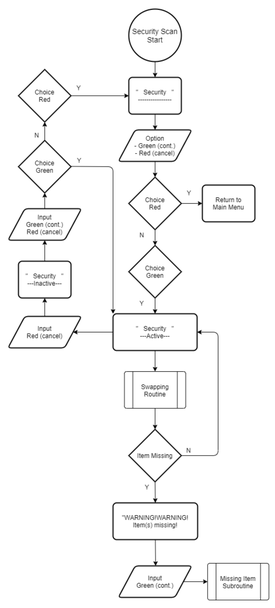
Main Menu:



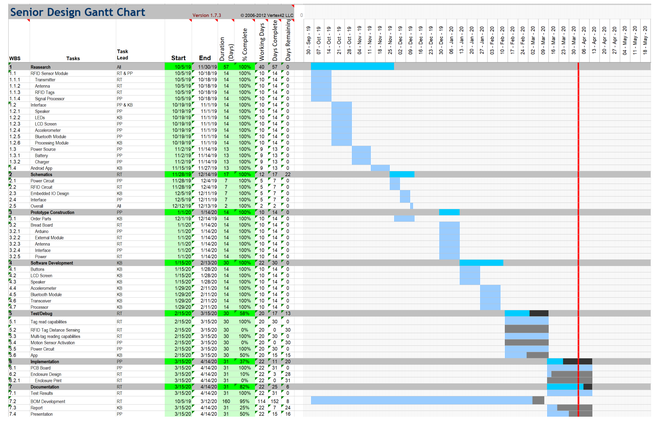
Check In/Out:



Security/Quick Scan:



PROCESS



FINANCIALS

Component	Quantity	Unit Cost	Total Cost
Antenna	1	$ 145.00	$ 145.00
Arduino Mega	1	$ 38.50	$ 38.50
Lithium Ion Polymer Battery - 3.7v 2500mAh	2	$ 14.95	$ 29.90
PowerBoost 1000 Charger	1	$ 19.95	$ 19.95
LCD Screen	1	$ 10.00	$ 10.00
M6E Nano w/ Breakout Board	1	$ 224.95	$ 224.95
Passive RFID Tag (set of 5)	2	$ 1.95	$ 3.90
UFL to SMA Interface	2	$ 4.95	$ 9.90
Misc. components	1	$ 10.00	$ 10.00
	Total		**$ 492.10**

OBSTACLES

- Sizing constraints
  - The original backpack-sized concept was unable to be realized due to the size of the antenna needed to achieve the desired range
- FCC regulations
  - Ambiguously worded regulations made it difficult to determine what safe limits of exposure to RFID frequencies were.
- Effects of COVID-19
  - Collaboration and resources for final build was severely restricted due to COVID-19.

IMPROVEMENTS

- Custom design all components
  - Most components used were off-the-shelf for this prototype. Redesigning the electronics to fit on a single PCB, eliminating unnecessary hardware, and designing an antenna to better fit the design requirements would drastically reduce size, and cost at scale.
- Companion app
  - A companion smartphone app would simplify the user interface and operation even further.