

Title: LuggAlert (Luggage Pickup Service)

Group Members: Ernest Jackman - Electrical Engineer
Adrian McGrath - Computer Engineer
Tomasz Pytel - Computer Engineer

Customers: Airline companies, frequent fliers, special service flight passengers

Sponsors: **NCR (?)**

Description

Airport terminals are typically crowded on baggage claim areas and lack a certain ease of use as the passengers stand around anxiously awaiting their luggage to come out to claim. Our project would help alleviate that burden by scanning tags to identify a person's bags and send them a notification via text message that they are ready for pick-up. A monitor next to the baggage carousels will also be used to show a real-time table of luggage about to come out to the baggage claim area, as well as luggage which can already be found in the baggage claim area. This would result in a more orderly luggage retrieval process, compared to the current chaotic process. The goal of the system is to read data from RFID chips located on tags attached to luggage bags to communicate with the airline and identify who the luggage belongs to. The system should be robust to handle communication with different airlines in the accurate identification of luggage. The structural integrity of the mounted scanner should be able to fit any baggage carousel and easy to attach.

There are currently no products on the market which address the specific situation we are addressing. There are some products which are being advertised to airports for the purpose of improving their baggage handling systems' accuracy, but even those don't address improving the passenger experience in the baggage claim area.

Requirement Specifications

Goals and Objectives

- 1) System must be able to scan and decode rfid's accurately.
- 2) System must perform with minimal delay.
- 3) System must run on a continuous power supply.
- 4) Must comply with all health and safety regulations.
- 5) Must comply with all environmental regulations.
- 6) Must comply with all legislature and US laws and regulations as of 2015.
- 7) Product should be operational out of the box with some assembly required.
- 8) Must be able to operate 24/7 in an airport environment
- 9) Cost of product must be reasonable
- 10) Able to allow free passage of all objects through the scanning area.
- 11) Operate with correct procedures for the access and use of personal information

Required Specifications		
Goals Met	Requirement	Justification
6	Must meet airport transmission standards	Regulation of frequency use and transmission of specific data from the RFID: ISO/IEC 18000-3 and ISO/IEC TR 24729-1:2008
1	RF Receiver must accurately scan the RFID chip 95% of the time	In order to insure customer satisfaction
1,2	System must accurately identify who the luggage belongs to 95% of the time	So the system is able to contact the correct person
2,8	Must send text message notification to the correct recipient with a maximum delay of 60 seconds.	In order to insure customer satisfaction
7,9	Must not exceed funds of \$2,000 to construct	
3,8	Will use wall outlet to power scanners and microcontroller.	Must be able to run continuously.
4,5	Must not have any negative impact on the environment or personal	Do not want to cause any harm
10	Must meet size requirements to allow clearance for luggage	Clearance so all packages passing through the scanner goes unobstructed.
4,5	Must not emit any harmful radiation and is safe to handle	Do not want to cause any harm
11	Security between the tags information and the database must be secure and not allow any unauthorized access.	Secure information is required to prevent any unauthorized data release
1,2,8	Promptly notify passenger when their luggage is scanned	In order to insure customer satisfaction

Constraints

Limitation in reader and transmission range, Tag Housing stability and ruggedness will also put a constraint on maintaining the tag with the luggage to be scanned. Communication protocols with airline database will need to match for proper gathering of a person's name and number for contact. Limitation of mount brackets for carousel/conveyor types.

Standards

ISO/IEC 18000-3

ISO/IEC TR 24729-1:2008

Functionality

Must scan RFID chip, transmit RFID chip data via query to airline database. Receive airline database phone number, and send out a text message notification to acquired phone number. This system should process information continuously, and show real-time data of recent scanned tag to a display.

Economics

Produced cheaply but with reliable and hardy parts that can last a long time, while still providing reliable consistency in detection and system stability.

Energy

Awaiting final part order to determine power consumption and radiation values.

Environmental

This product will radiate electromagnetic fields.

Health and Safety

Must not emit any harmful radiation

Legal

Must query the airline database but never directly access it. Must not impede the security of data being transmitted or received. May not infringe on any copyright laws. May not breach any data security.

Manufacturability

No current information on manufacturability since product has not been prototyped yet.

Operational

Potential impacts on the device include extreme conditions of temperature, power surges, high impact forces, potential flooding dependent on conveyor positioning with ground floor.

Political

No known political or governmental approval requirements at this time.

Reliability and Availability

System must be reliable in its ability to scan every tag presented though it and process the tags information in a timely manner in order to update the display and send out a notification of the baggages arrival

Social and Cultural

Promptly notify passenger when their luggage is scanned and identified to provide better time management for the passengers.

Usability

Must be easy to assemble and get operational out of the box. Simple clamp/bolts, followed by plug and play operation of the software.

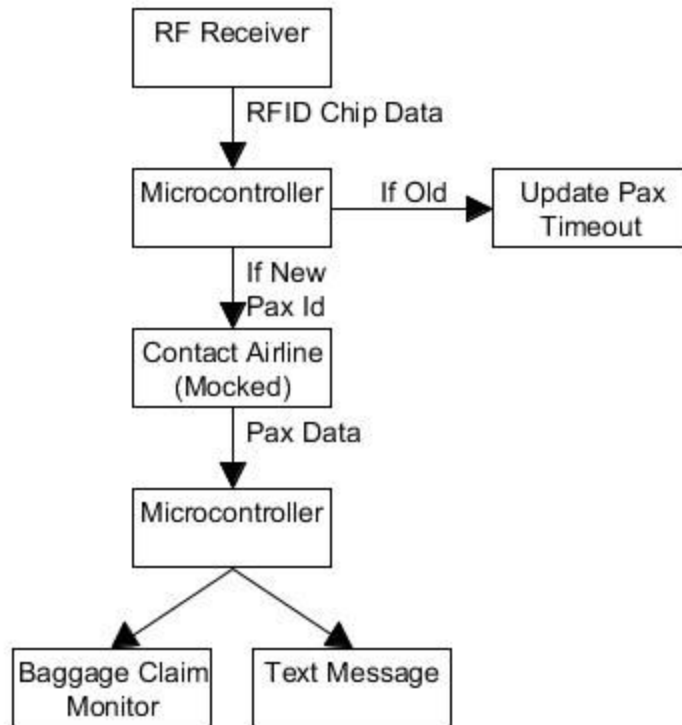
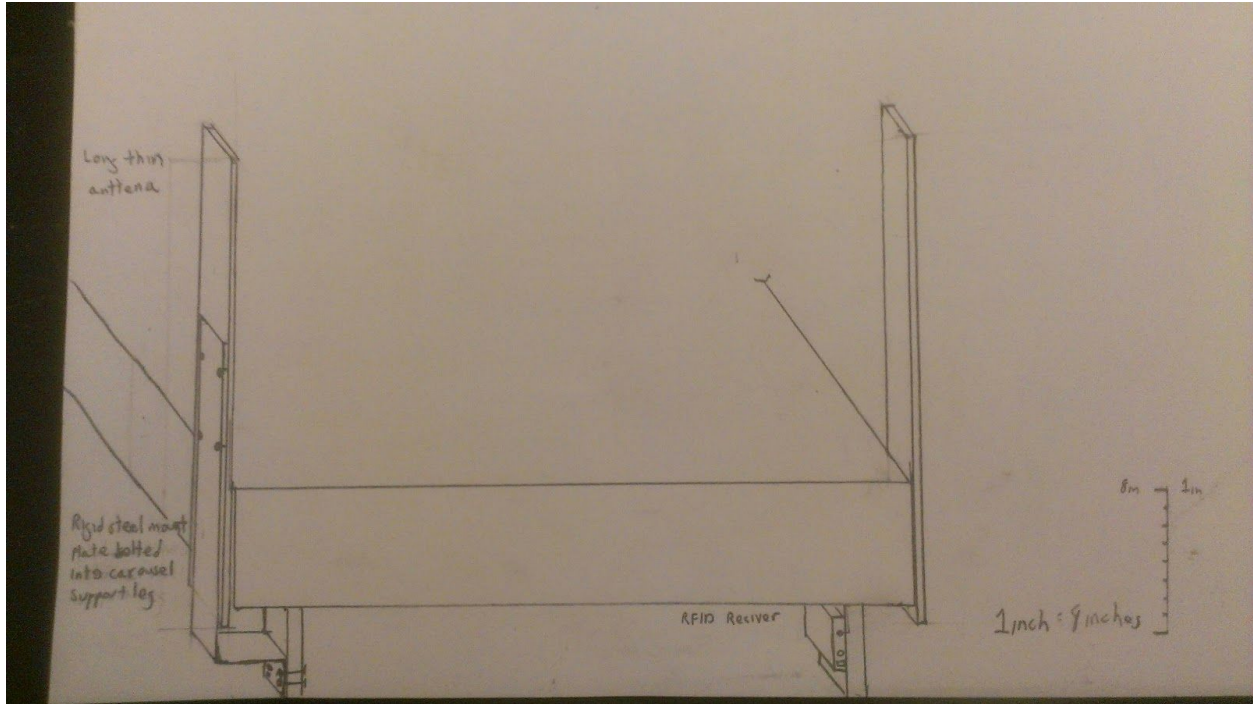


Figure 1 - Project block diagram and illustration



Conveyor system will include one or two tower antenna for the RFID receiver which will be mounted on the underside of the conveyor on one of the floor braces, along with the antenna towers being brackets to the same floor mounts the conveyor system is attached to. Any potential plastic covering will have to be custom cut or made if side panels are present on the conveyor system.

Estimated project budget

\$1500 - assuming two receivers at around \$400, \$55 for microcontroller, \$100 monitor for display, plus hardware for mounting, and cables for connection of devices, unforeseen additions to the project should something falters or needs to be upgraded/replaced. This is not including any hours paid for programing or construction by the creators.

Milestones

Summer 2015			
Week	Activity	Time	Person
May 31 - June 6	Design Documentation	All Week	Everyone
June 7 - June 13	Research Microcontroller		
June 14 - June 20	Research Implementation Of Code On Microcontroller		
June 21 - June 27	Research RFID and Housing		
June 28 - July 4	Research RFID Scanners		
July 5 - July 11	Research SMS Stuff		
July 12 - July 18	Research Scanner Reading		
July 19 - July 25	Finalize Software Design	1 week	Adrian
	Finalize Software Design	1 week	Tomasz
July 26 - Aug 1	Establishing Coding Standards	1 week	Adrian
	Establishing Coding Standards	1 week	Tomasz
Aug 2 - Aug 8	Setting up IDE For Software Coding	1 week	Adrian
	Setting up IDE For Software Coding	1 week	Tomasz
Break			
Aug 9 - Aug 15	Setup Code Repository	1 week	Adrian
	Setup Code Repository	1 week	Tomasz
Aug 16 - Aug 22	Setup Code Project	< 1 week	Adrian
Fall 2015			
Aug 23 - Aug 29	Code Core Models	< 1 week	Adrian
	Unit Test Core Models	< 1 week	Adrian
			Tomasz
	Work With Microcontroller		Ernest
Aug 30 - Sept 5	Code Cache	< 1 week	Adrian
	Unit Test Code Cache	< 1 week	Adrian
	Code TV Output Table	< 1 week	Tomasz

			Ernest
Sept 6 - Sept 12	Setup System DB And Webservices	1 week	Adrian
	Unit Test TV Output	< 1 week	Tomasz
			Ernest
Sept 13 - Sept 19	Setup Mock DB And Webservices	1 week	Adrian
			Tomasz
	Build RFID Reader		Ernest
Sept 20 - Sept 26	Code Connections to System Airline DB	< 1 week	Adrian
	Unit Test Connections to System Airline DB	< 1 week	Adrian
	Code for reading Scanner	1 week	Tomasz
			Ernest
Sept 27 - Oct 3	Unit Test Connections to Mock Airline	< 1 week	Adrian
	Code Connections to Mock Airlines	< 1 week	Adrian
	Unit Test Scanner Reading Capabilities	1 week	Tomasz
			Ernest
Oct 4 - Oct 10	Code SMS Implementation	1 week	Adrian
			Tomasz
	Build RFID Writer (optional)		Ernest
Oct 11 - Oct 17	Unit Test SMS Implementation	1 week	Adrian
	Code RFID Writer (optional)	1 week	Tomasz
			Ernest
Oct 18 - Oct 24	Buffer Week	1 week	Adrian
	Unit Test RFID Writer Capabilities (optional)	1 week	Tomasz
			Ernest
Oct 25 - Oct 31	Implementation On Device	1 week	Everyone
Nov 1 - Nov 7	Testing Prototype	1 week	Everyone
Nov 8 - Nov 14	Testing Prototype	1 week	Everyone
Nov 15 - EOS	Prototype Completed And Presentation		Everyone

Block Diagram Key



Blue = Hardware



Orange = Design


Green = Research


Red = Completed


Pink = Optional


	Ernest Jackman	RFID chips	To be Acquired
<p>Passive High Frequency or Ultra High Frequency Radio Frequency Identification Chips will need to be purchased with written data.</p> 			


	Adrian McGrath	Airline Database (Mock)	Design
<p>Mocked Airline Database to be designed as no databases are provided by existing airlines.</p> 			


		RFID Types	Research
<p>Research to determine which passive RFID chips that are appropriate for implementation. High Frequency or Ultra High Frequency.</p>			


		RFID Receiver	Research
<p>Research to determine type of receiver and appropriate antenna based on frequency and type</p>			


		Microcontroller	Research
Research to determine which microcontroller is suitable for implementation. Desired to support Java programming language.			


		RFID Housing	Research
Research to determine which method is ideal for attaching tags to luggage.			


		RFID Writer	Optional
Up for consideration if needed or not.			

		SMS stuff	Research
Up for development.			

		RF Scanner Reading	Research
Researching to determine how data is read in by the RF scanner.			

		Microcontroller Comm.	Research
Research about microcontroller specifics from the software side.			

		Repository	Research
Research about code repositories.			

		Display Screen	Acquired
Display screen already acquired for data display. 32" LCD			