Air Guide

Akintelure Oluwasemilore, Graduate Category | Dr. Richmond I. Nettey, College of Aeronautics & Engineering

Abstract

Baggage transportation has been a problem since the 1950s, and as researchers project airports to have an overflow—because of pent-up demand—airports will have to restructure and divert costs to long-term solutions. While this research addresses the challenging issue of transporting bags from the parking area, the butterfly effect is far greater than that and extends to affect other essential parts of airport operation.

As the former FAA Administrator, Stephen M. Dickson, once said, "airports are the heart of the U.S. aviation transportation system." In a world going from horses to driverless mobility, airports should be ready to welcome the next step of aviation. This study set out to find a solution to these problems to increase comfort and eventually generate virus-proof airports. This next-generation airport essential helps address these problems by transporting bags through the airport, starting from the parking lots. With the guidance of the FAA, Air Guide can reinvent aviation for the world by addressing challenges right at arrival.

Introduction & Background

The challenge is luggage transportation optimization. As people fly more often, the pace of growth and unexpected events have often overwhelmed the best-intended designs and plans. In the 21st century, airports have become the heart of civilization. With the event of a global pandemic, the world is forced to look at situations differently and provide systems that can be persistent in the face of obstacles. This is motivation to research and build a system that could make airports virus-proof. If aviation can take one lesson from this crisis, it is that the key to recovery and restart is digital transformation and technology. Airports often invest in temporary solutions to fix problems with a high likelihood of reoccurrence.

Research Questions

- How can we make airports resistant to viruses now and prepare them for a virus-prone future?
- How do we meet the above standards while making the experience better for passengers?
- How can we use available technology to increase safety in our airports and wellness for our passengers?

Methodology

The research approach for this project began with identifying and developing the problem and the solution. This solution had to:

- Reduce wait times.
- Be cost-efficient for the airport and easily accessible by diverse people.
- Increase all round safety

The next step was to begin the design process and we made the first preliminary designs (Figure 3). Subsequently, the right type of materials and proposed build for the project was studied, which includes finding the materials to use for the build of the Receptacle and the Safe Transports. The intent was to use an autonomous system to improve productivity and perform essential tasks, putting no passenger at risk.
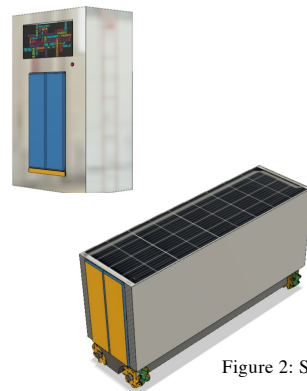

Figure 1: Receptacle

Figure 2: Safe

Results

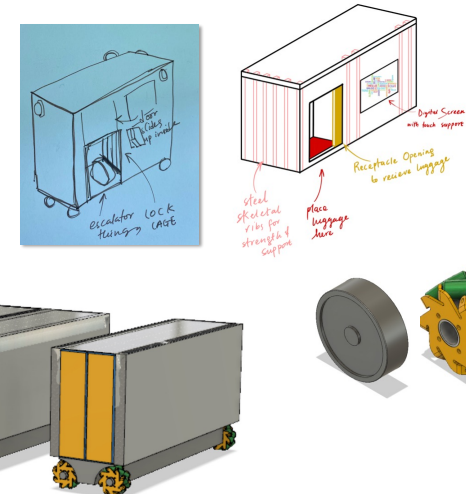Figure 3: Initial Air Guide concept, composite design, initial tire system, and mecanum wheels

Figure 4: "Train Like" Safe Unit System Latching to Air Guide Receptacle Before Take Off

Air Guide is the complete operating system that operates a self-check station (Receptacle) that collects, scans, and transports luggage from parking lots to the airport terminal for further processing. Some key features include a virtual queue system, complete autonomous navigation, solar panels, cameras, mecanum 360-degree wheels, and monitoring & disinfecting systems. The Air Guide system uses intuitive signaling and facilitated way-finding (with Google Maps API) by meshing hardware and software to curate a user-pleasant experience and ideal transportation of luggage.

To be made with a polycarbonate fiber, Air Guide is resistant to severe weather. In addition, Air Guide uses VPNs, an AES 256 encryption, and a blockchain system to protect the information of all passengers mitigating cyber risks. With effective integration into airport databases and navigation systems. This would be an innovative investment for airports to restructure public spaces.

Discussion

The measure of how many people this solution is going to impact is broad. Air Guide will give passengers power, Using this technology, passengers can pre-book a time slot for processing, such as for baggage check-in or TSA. Apart from safety, this product helps prevent passengers from feeling locked in any area, for any length of time – giving them control over their airport journey. Airports can adjust time-slots in real-time, based on queue wait times, changing arrival patterns, lane productivity, and processing capacity. Virtual wait queues provide airports with better forecast data for accurate checkpoint planning.

References

ACI Insights. (2020, November 11). *Contactless travel is the new mantra at GMR-led Hyderabad International Airport*.
Bednarek, J. (2019, January 17). *Airports will continue to face the same struggles…*Business Insider.
Cicchiello, C. (2020, June 26). *Here's everything you need to know about flying in the COVID-19 era*. TODAY.
More References available upon request.