



NEW PRODUCT DEVELOPMENT

Assessment 1 (Part 1)

Unit Code : ENGR6005

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AIRGO

Automated Luggage Carrying Trolley For Airports

A motor-operated luggage carrying trolley specifically created to assist passengers with its advanced features of assisted movement, luggage weight measurement and a GPS-fitted display to guide passengers towards their respective terminal gates while providing real-time flight information.

Air travelling has become an essential part of human transportation. However, there are still inconveniences every passenger faces during their transit time on Airports. These issues include pushing heavy luggage weights, queues around weighing machines, security of belongings, real-time information about flights and delays, and locating correct terminal gates. This innovation proposed by AIRGO will address each issue with its advanced technical functionalities. The structural diagram of the automated trolley, along with its components, is shown below.

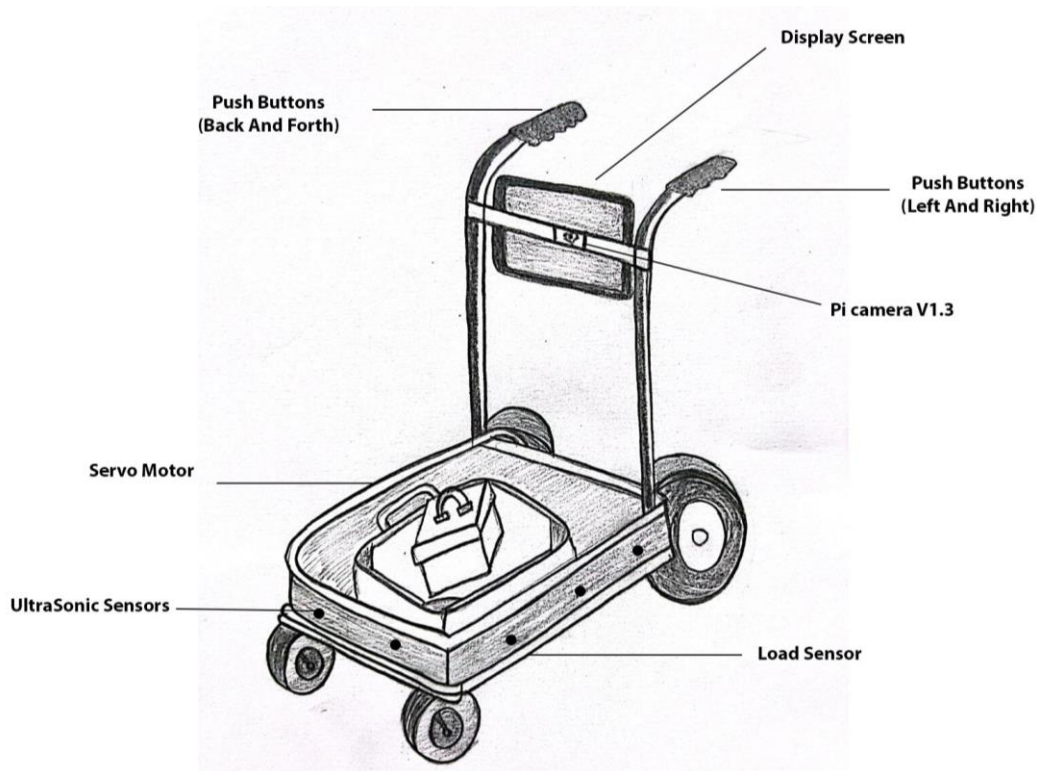


Figure 1 : Labeled Sketch of Exterior with Components

This machine uses a servo motor that allows the trolley to precisely govern its angular position, acceleration and velocity for smooth movement. “Motor is connected to a sensor for position feedback which receives signals that would dictate the position of the servo shaft and a power applied to its DC motor to turn the shaft to a particular position” [1]. The control of

the movement will be implemented using push buttons attached to the handles of the trolley [2]. The buttons on the right handle will allow moving back and forth at an average walking speed of 4km/h, while push-buttons on the left handle will control the turning of the front wheels. The intelligence of the machine is powered by a microprocessor called Raspberry Pi, a vision based technology that connects the airport's database with its own to execute all the novel features offered by AIRGO. It uses Pi camera V1.3 and ultrasonic sensors to detect objects in front of it to avoid collision by applying breaks and beeps when an obstacle is too near [3]. The suggested product will have a load sensor attached underneath the rack that will measure the weight of the luggage [4], providing passengers with the convenience of adjusting the weights according to flight requirements to avoid paying excess luggage fees when boarding or waiting in long queues for self-weighing. Furthermore, the weight-locking feature will trigger an alarm if the luggage is accessed (sudden weight reduction) once it has been locked to a certain weight, enhancing the security of personal belongings [5].

These newly designed luggage trolleys will provide passengers with an attached "smart touch screen tablet that offers the directory map of the airport" [6]. Passengers can make use of the map to navigate towards a selected destination (cafes, shops or terminal gates) by following the route displayed on the screen. The display will also show current promotions and offers available within the airport, including restaurants, duty-free shops, service lounges, travel agencies, etc. Upon entering or scanning the boarding pass, the screen will also regularly "update the travellers with flight information in case the gate has changed or the flight gets delayed or cancelled" [6]. It will be operated under a simple user interface, which will be available in multiple languages, assisting passengers from various nationalities.

These innovative functionalities mentioned above set this trolley apart from traditional trolleys currently being used in airports. Its assisted movement will ease the burden of traversing, saving energy, especially when having prolonged layovers. The attached screens will also make the experience at the airport much more convenient as there would be a significant reduction in passenger concerns about their flight information and terminal gates. A guided route towards their destined gate can save time, which can be better utilized on facilities provided by the airport, helping generate revenue to further elevate the airport experience.

References

- [1] M. C. A. Abas and P. D. Cerna, "Design and Development of Microcontroller Remote Controlled Airport Luggage Cart," *Science and Education*, vol. 4, no. 2, pp. 49-54, 2017.
- [2] M. H. B. HAIZI, "AUTOMATED LUGGAGE CARRIER," 2020.
- [3] R. Chauhan, V. Chaudhary, P. S. Deb, and R. Choudhary, "Luggage Carrying Trolley Using Raspberry Pi," in *2022 2nd International Conference on Advance Computing and Innovative Technologies in Engineering (ICACITE)*, 2022: IEEE, pp. 648-650.
- [4] R. Ravindaranaath, K. Karthik, R. Vishnupriyan, S. Suryakumar, and G. Thamaraiselvi, "Automated Trolley System for Airport," *International Journal of communication and computer Technologies*, vol. 5, no. 1, pp. 32-35, 2017.
- [5] G. Roja and R. S. Kumaran, "Automatic Movable and Secure Trolley using RFID," *International Journal for Research and Development in Technology*, vol. 7, no. 4, pp. 402-405, 2017.
- [6] H. Al Enezi and S. Esmaili, "Design of a Drivable Airport Luggage Trolley," in *2021 3rd International Congress on Human-Computer Interaction, Optimization and Robotic Applications (HORA)*, 2021: IEEE, pp. 1-4.