Airport Tracking and Traffic Control Management System (ATTCM) - WKT4-16
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Project Introduction

Airport ground handling and management encompasses the airline support operations of an airport as acts as an integral compliment to the otherwise more visible operation of Aircraft. Ground handling is a delicate coordination between multiple entities such as ATC and local ground roles. The creation of a system which can effectively manage ground handling systems can greatly improve the efficiency of an airport, and decrease turnaround time for aircraft while reducing the amount of resources needed. Therefore, the Airport Tracking and Traffic Management System (ATTCM) has been proposed.

Objective

ATTCM represents a hardware and software system which aims to improve the current airport ground handling operation efficiency by automating and distributing tasks for vehicles to complete. The System has 3 main functions:
1. Vehicle Task Scheduling and Resource Allocation
2. Routing prediction + Asset Tracking
3. Presentable User interface

Methodology

Task Scheduling and Resource Allocation

Tasks and Assets are treated as containers which hold specific information. Various scheduling algorithms were tested. This includes a baseline First Come First Serve, Priority Based and a Shortest-Time-Dependent Algorithm.

- Cycle = 2
- Cycle = 1

The shortest-time algorithm evaluates shortest time to completion in every cycle of operation with respect to distance (provided by routing) and task availability. Due to the different nature of every task and completing speed of asset, a load balancer which evaluates through regression was developed to take advantage of redistributing free resources between Tasks and Assets.

Asset tracking + Routing prediction

Assets tracking uses the data from a ceramic GPS modules and extract the NMEA code in Arduino IDE. These real world coordinates will then transform into the coordinates of unity which is display the location of vehicles.

User Interface

Upon the integration of the previous two sub-sections, all of our sub-sections will be displayed through the User Interface. Users are able to enter several parameters into the system. These parameters will be used as input for both sub-sections. All data is transferred and communicated through a central SQL Server.

Conclusion

Overall, the endeavor to implement the ATTCM is a successful one. With the combination of individual sub-projects of Route Prediction, Map overlay, User Interface and Task Asset Scheduling, ATTCM is able to provide users with a holistic system, which is able to fulfill the original objectives of automatic task allocation and resources allocation, routing prediction and GPS tracking as well as a presentable User Interface. In addition, ATTCM is able to successfully cover gaps in modern proposed tracking systems such as ALLEGRO and CARMA by implementing a program, which covers Ground Vehicle management from task allocation to tracking to interaction.