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Development of safe flying protocol

Karan Ganesh
karanganesh97@gmail.com
Noorul Islam Center for Higher Education, Kanyakumari, Tamilnadu,

Jessysonia S. P.
jessysoniasp@gmail.com
Noorul Islam Center for Higher Education, Kanyakumari, Tamilnadu,

Ajith Raj R.
ajithraj006@gmail.com
Noorul Islam Center for Higher Education, Kanyakumari, Tamilnadu,

Rohith I. J.
ijrohith1992@gmail.com
Noorul Islam Center for Higher Education, Kanyakumari, Tamilnadu,

ABSTRACT

The primary purpose of ATC worldwide is to prevent collisions, organize and expedite the flow of air traffic, and provide information and other support for pilots. In some countries, ATC plays a security or defensive role or is operated by the military. To prevent collisions, ATC enforces traffic separation rules, which ensure each aircraft maintains a minimum amount of empty space around it all the times. Many aircraft also have collision avoidance systems, which provide additional safety by warning pilots when other aircraft get too close. The air traffic control environment is a very stressful environment because it introduces the element of "life and death" to the table. The responsibility of an ATC staff is huge and they need to have razor sharp reactions to problems ranging from collisions to terrorists hi-jacking a plane. Despite all of its complexity, all the system are operated manually through staff supervision, by this project we intend to bring in an AI functionality for easing the process of air traffic control

1. LITERATURE REVIEW

Air passengers will nearly double to 7.8 billion according to the international air transport association 2036 forecast, which means that the rate of air traffic will increase exponentially leading to significant congestion, flight delays, and pollution. To keep these numbers of aircraft at safe distances from each other, to direct them during take-off and landing from airports, to guide them around bad weather and ensure that traffic flows smoothly with minimal delays; there is a need of new control techniques and optimized methods. The optimization and automation of air traffic control have been the subject of several studies in the last decades.

Air transportation frameworks are looked with taking off requests for air travel. As per the Federal Aviation Organization (FAA), the yearly air activity rate is required to develop by 3 to 5 percent yearly for at any rate the following 15 years. [l] In the perspective of the above issues and with an end goal to meet the difficulties of the following century, the flying network is moving in the direction of an imaginative idea called Free Flight [2]. Free Flight is possible as a result of empowering advancements such as Global Positioning Systems (GPS), Datalink correspondences [3], Automatic Dependence Surveillance Broadcast [3], Traffic Alert and Collision Evasion Systems (TCAS) [4] and ground-breaking on-board calculation. Compositional issues in extensive scale frameworks, various leveled furthermore, decentralized control frameworks, compromise furthermore, convention configuration, flight mode exchanging and half and half frameworks and additionally more conventional issues in the regions of way arranging and following, non-least stage frameworks and information immersion are basically a subset of the exploration plan in Air Traffic Management Systems. [5] At some random air terminal, delay happens when interest for terminal airspace or runways approaches the ability to deal with flying machine securely. Some postponement is typical and inescapable, particularly amid pinnacle activity hours or when the limit is diminished as a result of the unfriendly climate. At some real airplane terminals, in any case, the level of interest is currently with the end goal that delay is interminable and extreme. These postpone bothering travelers, increment carrier working expenses, and waste over a hundred million gallons of fuel every year.

A more quick approach to reducing delay is to oversee activity so request fits inside the existing limit. This should be possible through financial measures, for example, differential estimating plans to help redirect activity from crest to off-crest hours, or maybe from blocked to under-used air terminals. Regulatory measures, for example, hourly quantities or client limitations, could actuate reallocation of interest. The target of this paper is to audit deliberately momentum look into in the writing about the mechanization and enhancement of airport regulation frameworks

2. AIR TRAFFIC MANAGEMENT

This is the automated air traffic management system which runs the landing functions of the airport. The airport has to be built from bottom to top to suit the parameters of the system to function properly but it can be adjusted to work for other already existing just by changing the mapping of the runway and the way the airport function, which is completely do-able due to the fact we are not skilled at software, makes it astronomically difficult for us to achieve anything complex enough to run an actual airport.

To show this an imaginary airport with its own runway and path systems has been built. The program we have coded will be capable of considering few emergency conditions, the weather condition, the wind conditions, the path from which the aircraft is approaching the airport and the visibility condition on the airport. The program takes care of only the landing operation of the airport. The airport must meet few specifications for the program to work with it in the first place, the alignment of the runway, the paths they can be accessed and all. All the design criteria and other logic that make the program is discussed in detail in the upcoming sections of the document.

All the logics have their own reasoning and none of them are arbitrary. Some of them have been put up to make the program run as we expect it to and some of them are there because we were unable to come up with any other ideas and we were also bound by software skills and knowledge.

3. DESIGN CRITERIA

The airport that we designed has three long runways and all are placed parallel to each. From the left, the first runway will be called runway A and the second one will be called runway B, the rightmost one will be called the runway C. The runway B has been built in such a way that it perfectly aligns with the magnetic North-South line. From here on, many parameters have been eliminated because of the symmetry of the airport.

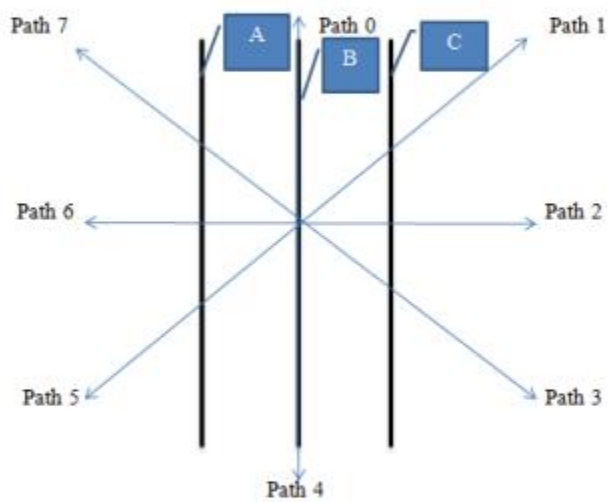

Fig. 1: The alignment of all the runways and the paths through which they can access

The alignment and positioning of the runway and the paths have been shown in figure 1. The arrangement has its own sets of logics,

1. The runway is long enough for two aircraft to land simultaneously
2. All the paths have different descent rates so the paths that aircraft might take will inherently slow them down. This gives the program the advantage of not computing the landing times
3. The paths 2 and 6 are on the off-side of the airport so the aircraft won't be able to land if they are approaching from those paths
4. All the path converge at the center, that's to depict the symmetry of the airport, it's because of this symmetry that different descent rates workout. These paths obviously won't lead all the aircraft to the center point as few would think.
5. So effectively there are six usable paths and each runway gets two paths each.

4. THE LANDING LOGIC

The aircraft landing sequence will be decided with the descent rates. The path 0, which is the first path has the shortest descent distance, so the flight on this path will land the first and hence the program will permit it to land on the runway B as path) is mapped to this path. The last aircraft will be the one which approaches the airport through path 4, as this path has the longest descent distance.

The other paths are arranged from their increase descent path, that is, path 1 is longer than path 0 but is shorter than path 3, the path being on the off-side of the airport, the aircraft on this patch have to be directed to the shortest path first; the path 1. Path 3 is shorter

than 5 and again six being on the off-side has to be directed to five and path 7 is shorter than path 4. The below is the order of the paths according to their descent path lengths.

Path 0 < path 1 < path 3 < path 5 < path 7 < path 4

4.1 Sequence of landing

The aircraft on the shortest path will land faster than the one on the longer path. By assuming this the system doesn’t have to concern itself with the time the aircraft might take to land and issues that accompany it. The order then will be,

1. The aircraft on path 0
2. The aircraft on path 1
3. The aircraft which was redirected from path 2 to path 1
4. The aircraft on path 3
5. The aircraft on path 5
6. The aircraft which was redirected from path 6 to path 5
7. The aircraft on path 7
8. The aircraft on path 4

4.2 Emergency conditions

The program is equipped to handle few emergency situations with its own set of logic, the landing sequence and logic remains the same, but the way the airport reacts to the aircraft changes. The different types of emergency situations that the program can handle are shown in figure 2.

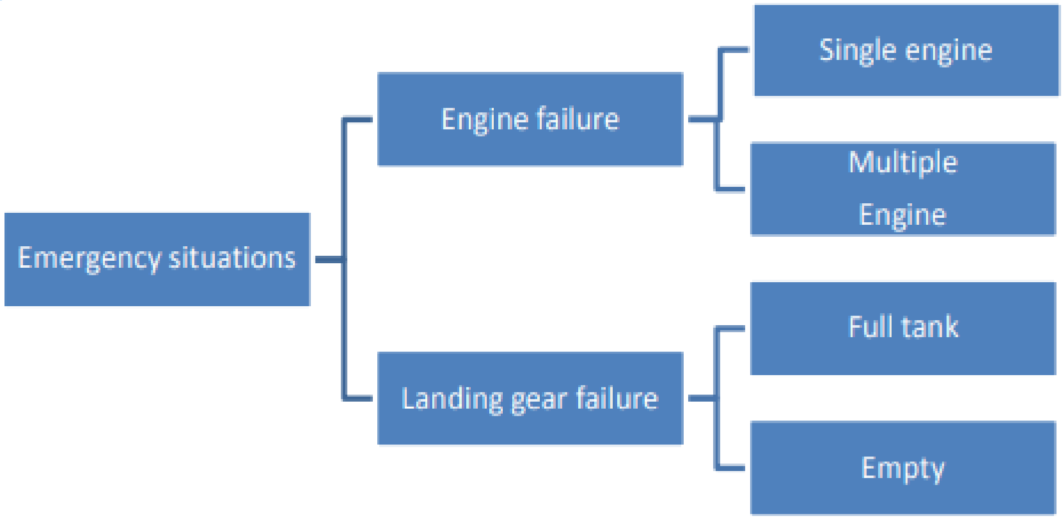

Fig. 2: Types of emergency situations

5. CONCLUSION

We are limited by the technology of our time. But to meet the demands of future, steps have to be taken now to make sure when the time comes, the system is ready to meet the requirements. A system which can think and react without human intervention will revolutionize the way see air traffic managing systems. Such type of systems will be constantly evolving to perform and also keep pace with increasing demands of traffic management.

6. REFERENCES

[1] Honeywell Inc., “Markets Report,” Tech. Rep. NASA Contract NAS2-114279, 1996.

[2] Radio Technical Commission for Aeronautics, “Final report of RTCA task force 3: Free flight implementation,” tech. rep., Washington DC, October 1995.

[3] Honeywell Inc., “Technology and Procedures Report,” Tech. Rep. NASA Contract NAS2-114279, 1996.

[4] W. H. Harman, “TCAS: A system for preventing midair collisions,” The Lincoln Laboratory Journal, vol. 2, no. 3, pp. 437- 457, 1989.

[5] G.Pappas, C. Tomlin, J. Lygeros, D. Godbole, and S. Sastry, “A next generation architecture for air traffic management systems” proceedings of 36th conference on decision and control San Diego, California USA, December 1997.