Objective

Among these vehicles, one leader (leading vehicle) and two followers (following vehicles) will be produced at the end of the project. The aim of the project is as follows: The leader will be the track follower. The track is pre-set to the leader by the computer. Moreover, commands will be given to the followers by the leader. The followers will follow the instructions from the leader and maintain a formation. Furthermore, a graphical user interface (GUI) will be implemented.

Overview

In the present society, automation is becoming more popular. The general public is increasingly interested in the "formation control," since this technique can help in different aspects. For example, mine-sweeping robots can form a formation in order to scan landmines more efficiently. NASA is also developing this system since this can prevent the robots from collision when they engage in research on another planet. Formation control is useful in different areas.

In the project, several tasks have to be completed. Vehicles have to be designed to track a desired route which is drawn on the ground. A control theory should be implemented in order to increase their robustness and prevent vehicles from colliding with each other or obstacles. Further, a Graphical User Interface (GUI) is implemented for demonstration of real-time trajectory and location of vehicles.

Methodology

The diagram above shows the overall flow diagram of our program. The followers get the desired location from the leader and move to that point.

Conclusion

The figure below shows the field test of three vehicles running a square route. It is shown that the followers can follow the leader going each point while maintaining the formation.

Field test result (upper left: the test first started, upper right: formation reaching the first corner, left lower: formation reaching the second corner, right lower: formation reaches final destination)