(Front Page)

Table of Contents:

1. **Project Vision pp. 00**

1.1. Backgrounds pp. 00

1.2. Socio-economic Impact, Business Objectives, and Gap Analysis pp. 00

1.3. Security and Ethical Concerns pp. 00

1.4. Glossary of Key Terms pp. 00

1. **Project Execution and Planning pp. 00**

2.1. Term Information pp. 00

2.2. Tools and Technology pp. 00

2.3. Project Plan pp. 00

2.4. Best Standards and Practices pp. 00

1. **System Requirement Analysis pp. 00**

3.1. Functional Requirements pp. 00

3.2. Non-functional Requirements pp. 00

3.3. On-Screen Appearance of Landing and Other Pages Requirements pp. 00

3.4. Wireframe Designs pp. 00

1. **Functional Requirements Specification pp. 00**

4.1. Stakeholders pp. 00

4.2. Actors and Goals pp. 00

4.3. Users Stories, Scenarios and Use Cases pp. 00

4.4. System Sequence / Activity Diagrams pp. 00

1. **User Interface Specifications pp. 00**

5.1. Preliminary Design pp. 00

5.2. User Effort Estimation pp. 00

1. **Static Design pp. 00**

6.1. Class Model pp. 00

6.2. System Operation Contracts pp. 00

6.3. Mathematical Model pp. 00

6.4. Entity Relation pp. 00

1. **Dynamic Design pp. 00**

7.1. Sequence Diagrams pp. 00

7.2. Interface Specification pp. 00

7.3. State Diagrams pp. 00

1. **System Architecture and System Design pp. 00**

8.1. Subsystems / Component / Design Pattern Identification pp. 00

8.2. Mapping Subsystems to Hardware (Deployment Diagram) pp. 00

8.3. Persistent Data Storage pp. 00

8.4. Network Protocol pp. 00

8.5. Global Control Flow pp. 00

8.6. Hardware Requirement pp. 00

1. **Algorithms and Data Structures pp. 00**

9.1. Algorithms pp. 00

9.2. Data Structures pp. 00

1. **User Interface Design and Implementation pp. 00**

10.1. User Interface Design pp. 00

10.2. User Interface Implementation pp. 00

1. **Testing pp. 00**

11.1. Unit Test Architecture and Strategy/Framework pp. 00

11.2. Unit Test Definition / Test Data Selection pp. 00

11.3. System Test Specification pp. 00

11.4. Test Reports per Spring pp. 00

1. **Project Management pp. 00**

12.1. Project Plan pp. 00

12.2. Risk Management pp. 00

1. **References pp. 00**

1. Project Vision

1.1. Backgrounds

Background/Vision Statement

On the modern battlefield, the ability to deploy troops on the ground in a fast and efficient manner is important to ensuring your side has the tactical advantage. One critical step in deploying troops is using vehicles to deliver troops to the correct destination. Today’s technology allows for the use of computer vision and robotics to control different vehicles. These pilotless systems must be able to drive to the correct location without hitting each other, as well as handle navigation issues that may arise with loss of sight. ← *Adjust*

1.2. Socio-economic Impact, Business Objectives, and Gap Analysis

To Do

1.3. Security and Ethical Concerns

Encryption/Decryption...

1.4. Glossary of Key Terms

**System Actors:**

Leader vehicle

Follower Vehicle

Pilot

Remote controlling device

Obstruction object Sensor

Follower Vehicle Line of Sight Sensor

**Domain Terminology:**

Leader Vehicle- The robot that the pilot is directly controlling with the Remote Controlling Device

Follower Vehicle- The robot(s) that autonomously follow the Lead Vehicle.

Pilot- The individual who utilizes the Remote Controlling Device to navigate the Lead Vehicle.

Remote Controlling Device: The tool used to input commands to the Lead Vehicle.

Obstruction Object: Any object that hinders the path of a Follower Vehicle.

Obstruction Object Sensor: The sensor that detects the presence of an Obstruction Object

Line of Sight: The state when a Follower Vehicle directly views the Leader Vehicle.

Follower Vehicle Line of Sight Sensor: The device attached to the Follower Vehicle that maintains and updates if Line of Sight is broken from the Lead Vehicle.

Navigational Log: The data the Lead Vehicle and Follower record to determine relative position.

Home Location: A specified position where any vehicle will be automatically be able to travel.

2. Project Execution and Planning

2.1. Term Information

2.2. Tools and Technology

2.3. Project Plan

2.4. Best Standards and Practices

3. System Requirement Analysis

**Requirements:**

1. The application shall allow the leader vehicle to move forward by remote control.
2. The application shall allow the leader vehicle to move backwards by remote control.
3. The application shall allow the leader vehicle to turn left by remote control.
4. The application shall allow the leader vehicle to turn right by remote control.
5. The application shall be able to transmit position changes to the follower vehicle.
6. The application shall allow the follower vehicle to interpret position changes into left position motion.
7. The application shall allow the follower vehicle to interpret position changes into right position motion.
8. The application shall allow the follower vehicle to interpret position changes into forward position motion.
9. The application shall allow the follower vehicle to interpret position changes into backwards position motion.
10. The application shall allow the follower vehicle to only follow directly behind the leader vehicle.
11. The application shall prevent the follower from colliding with the leader vehicle.
12. The application shall prevent the follower vehicle from being within a short distance around the vehicle.
13. The application shall allow the individual vehicles to be named.
14. The application shall allow individual vehicle’s lights to be color coded for visual identification.
15. All users actions shall not have a response time greater than 250ms
16. The application shall stop motion on all out of range remote controlled vehicles.
17. The system shall have zero severity level 1 defects.
18. The system shall only support one wireless controller at a time.
19. The system shall only support one concurrent pilot at a time.
20. Meantime between failures shall be at least 30 days.
21. The application shall be able to log diagnostic information about each drive.
22. The application shall be able to export diagnostic information about each drive.
23. The application shall be able to playback previous diagnostic information from earlier drives.
24. The application shall be able to specify the wireless band of the remote controller
25. The application shall allow the remote control to specify the channel of the remote control.
26. The application shall allow the remote control to control the forward speed of the leader vehicle.
27. The application shall allow the remote control to control the forward acceleration of the leader vehicle.
28. The application shall allow the remote control to control the backwards speed of the leader vehicle.
29. The application shall allow the remote control to control the backwards acceleration of the leader vehicle.
30. The application shall display a warning if the leader vehicle is unable to change its current position.
31. The application shall display a warning if the follower vehicle is unable to change its current position.
32. The application shall be able to display the current position of the leader vehicle upon being stuck.
33. The system shall support a remote control range of 20 meters.
34. The system shall be compatible with all major operating systems.
35. The application shall encrypt the positional changes of the leader vehicle.
36. The application shall encrypt the positional changes of the follower vehicle.
37. The application shall be able to decrypt the information transmitted from the vehicles.
38. The leader vehicle shall encrypt the signal sent to the follower vehicle(s).
39. The follower vehicles shall be able to decrypt the signal sent from the leader vehicle.
40. The application shall allow the leader vehicle to receive input from a remote control.



1. The application shall be able to determine location of lead vehicle upon loss of sight.
2. The application shall be able to designate any vehicle in the system as the lead vehicle.
3. The application shall be able to designate any vehicle in the system as the follower vehicle.
4. The application shall be able to use image pattern recognition to determine the location of the lead vehicle.
5. The application shall be able to navigate around obstructions in the following vehicles path.
6. The application shall be able to determine the distance between the follower and leader vehicle.
7. The application shall be able to determine the angular position between the follower and leader vehicle.
8. The application shall only have one leader vehicle at a time.
9. The application shall allow one or more following vehicles.
10. The application shall be able to determine orientation of following vehicle relative to lead vehicle.
11. The application should be able to register vehicles in the system.
12. The application shall notify the lead vehicle that the following vehicle(s) have lost sight.

3.1. Functional Requirements

3.2. Non-functional Requirements

3.3. On-Screen Appearance of Landing and Other Pages Requirements

3.4. Wireframe Designs

4. Functional Requirements Specification

4.1. Stakeholders

4.2. Actors and Goals

4.3. Users Stories, Scenarios and Use Cases

4.4. System Sequence / Activity Diagrams

5. User Interface Specifications

5.1. Preliminary Design

5.2. User Effort Estimation

6. Static Design

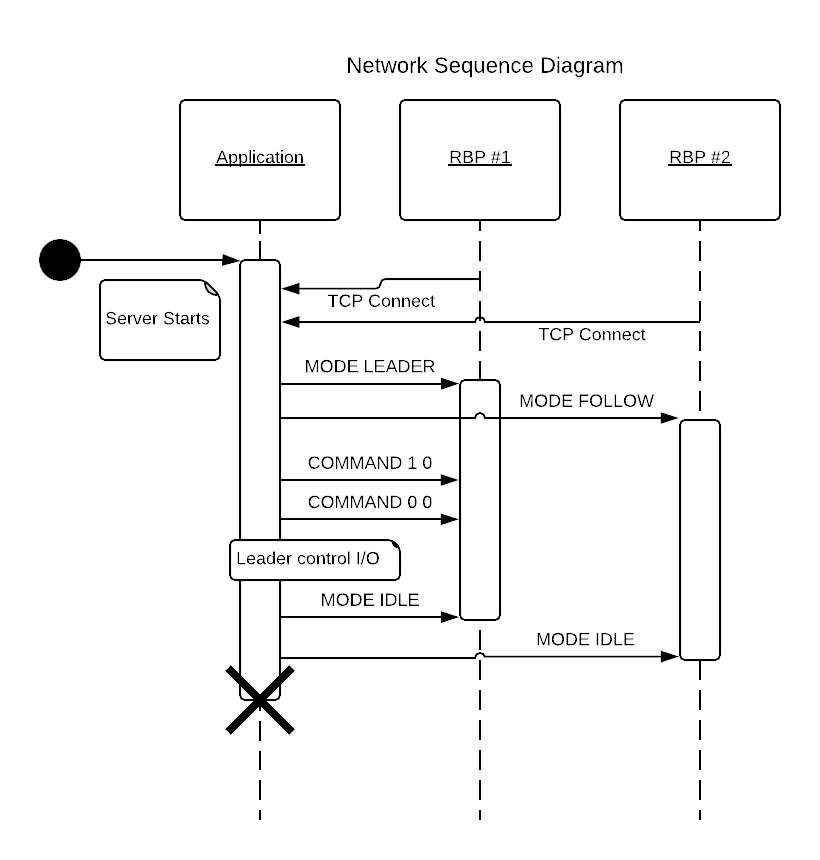
6.1. Class Model

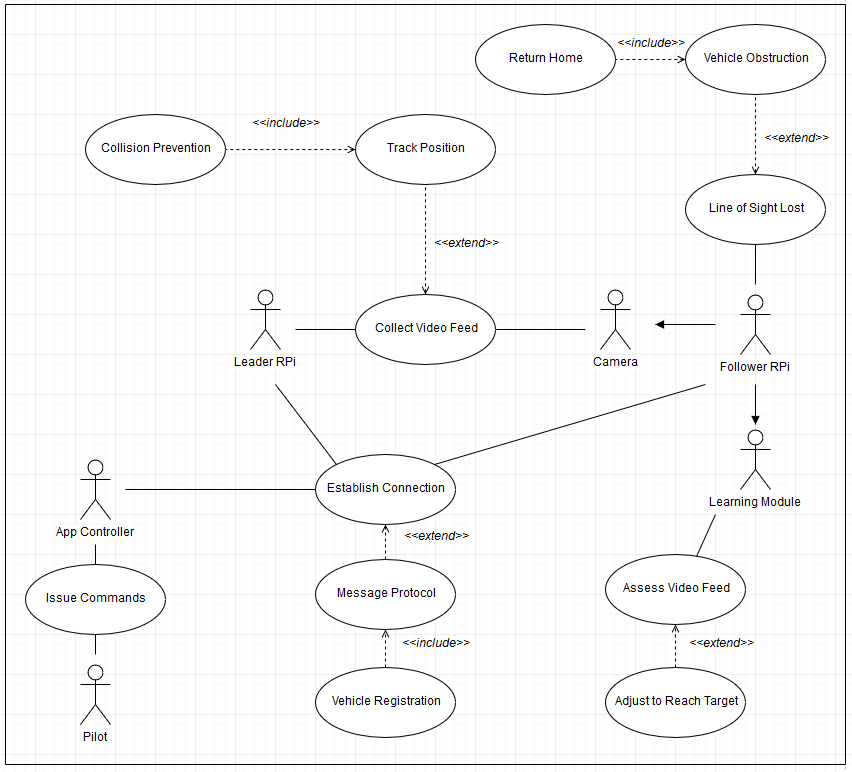
6.2. System Operation Contracts

6.3. Mathematical Model

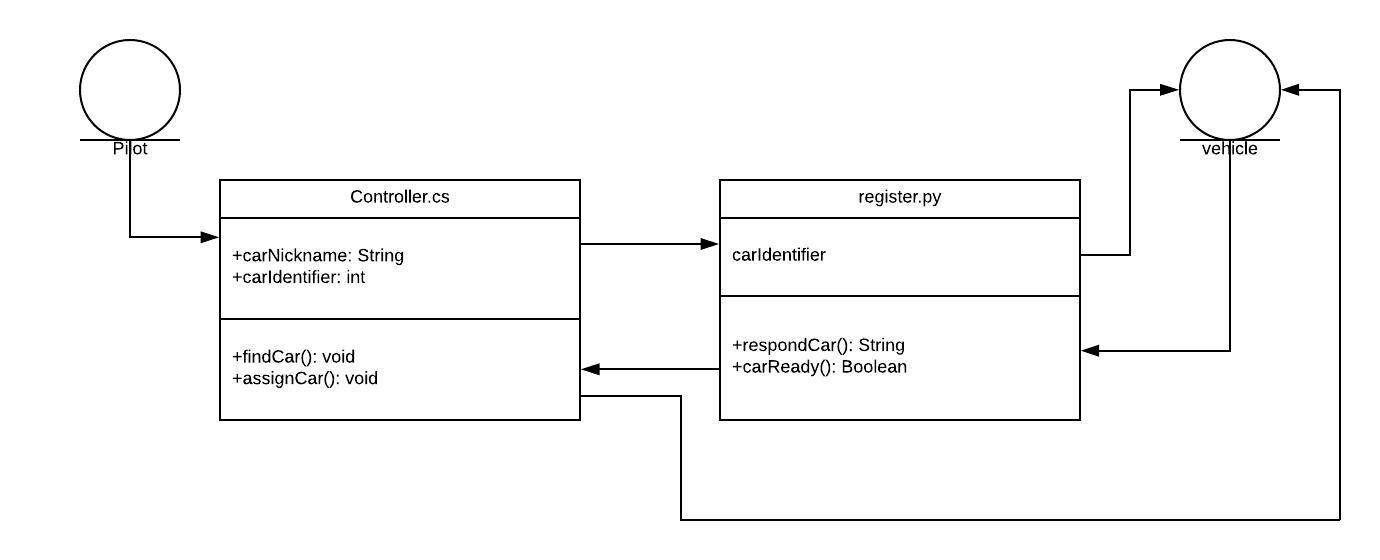
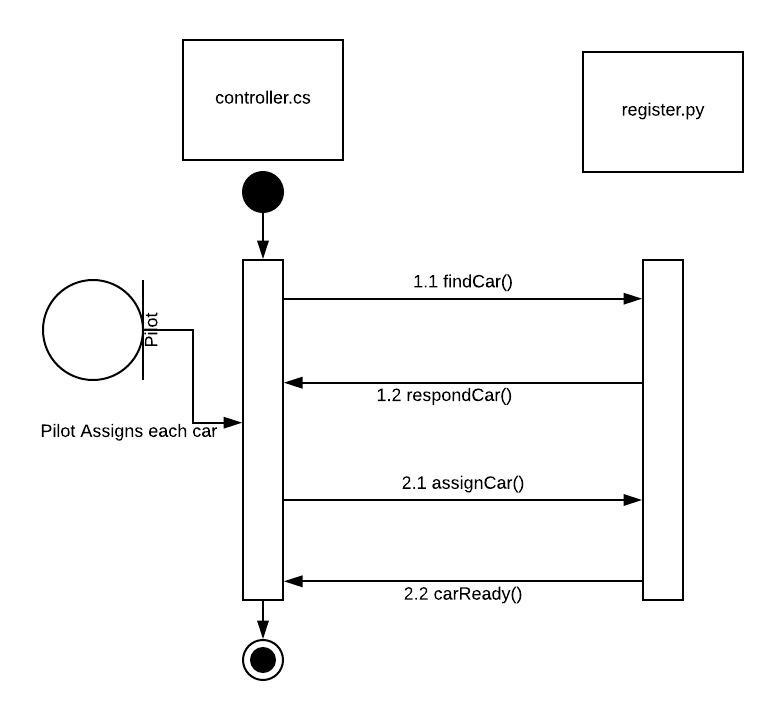
6.4. Entity Relation

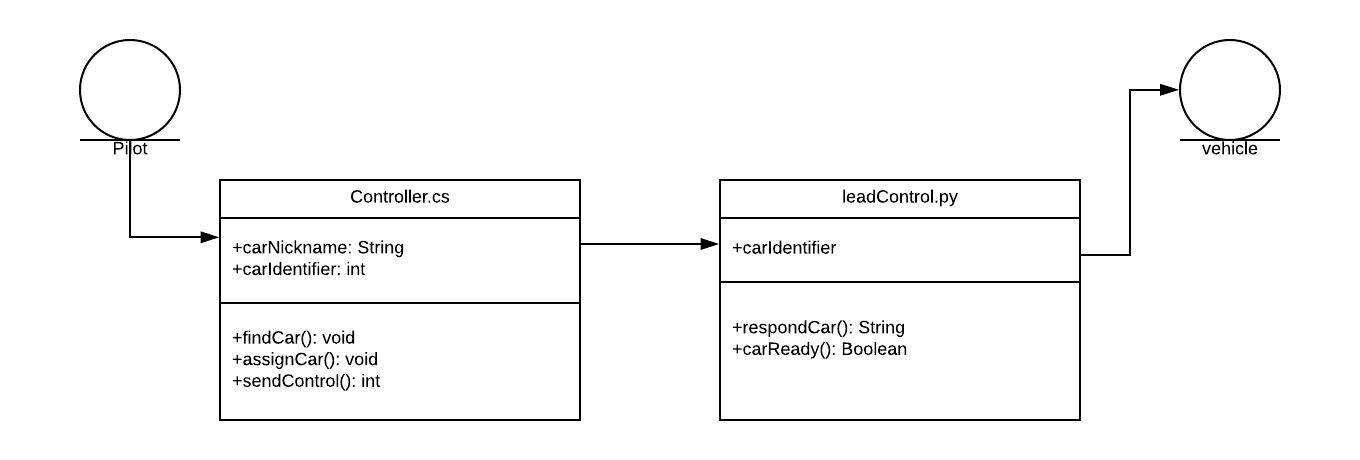
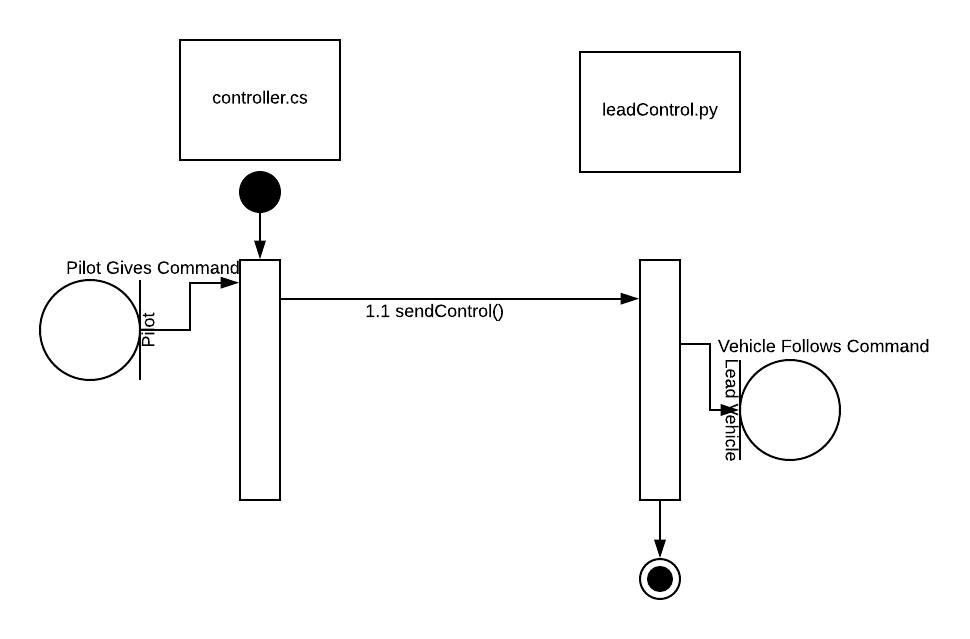
7. Dynamic Design

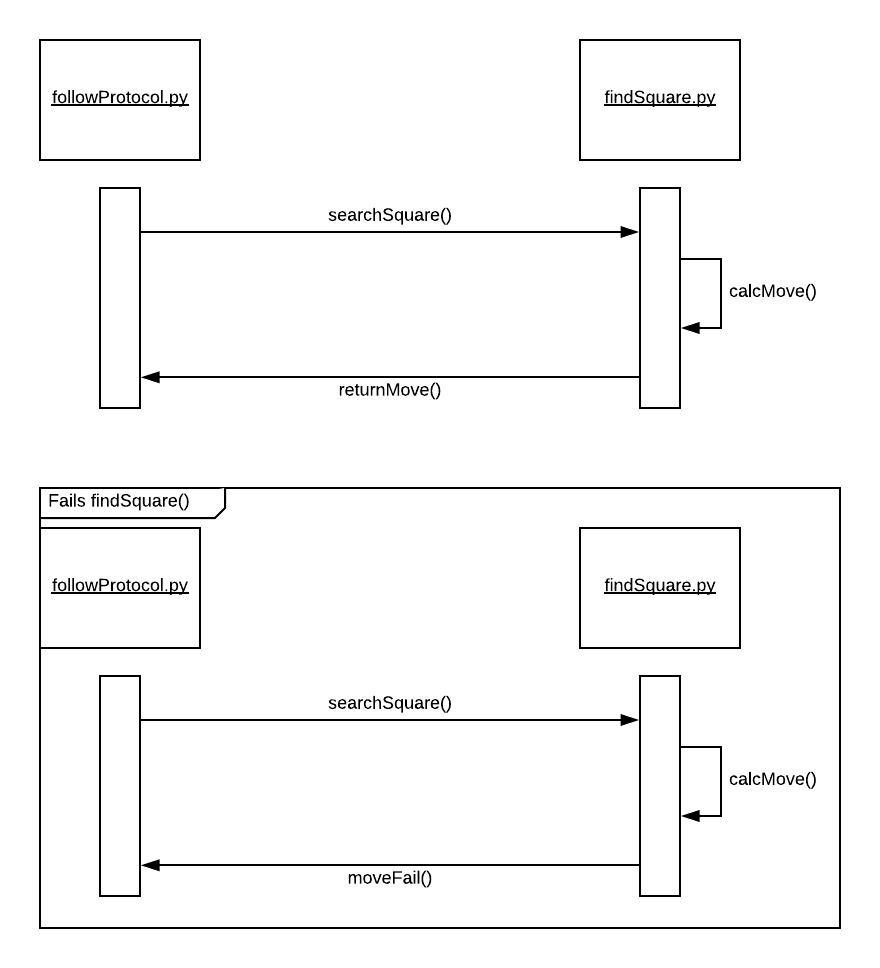
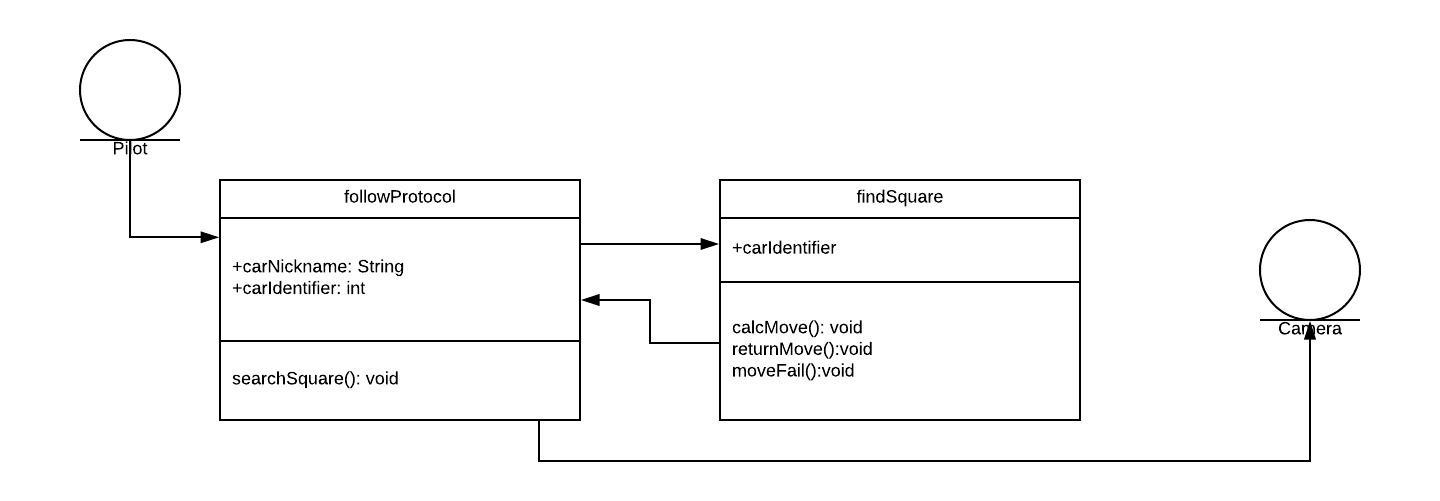


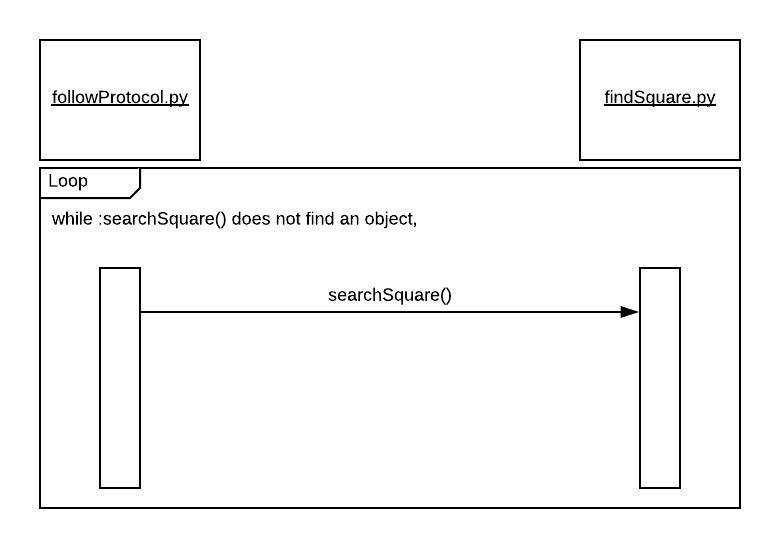
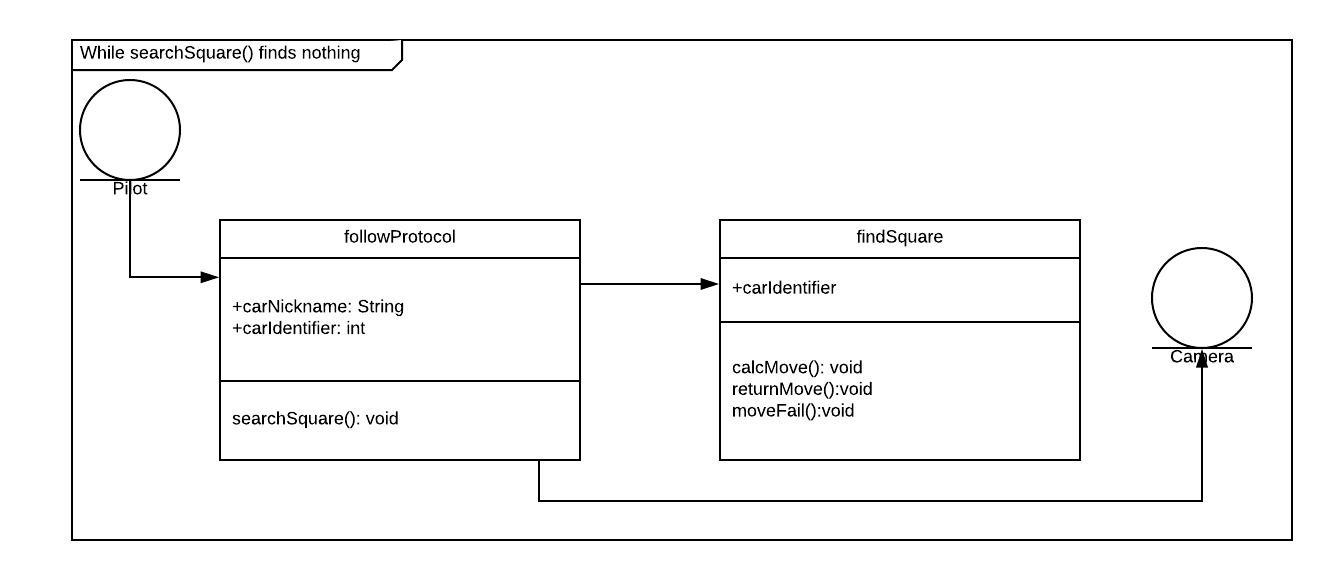


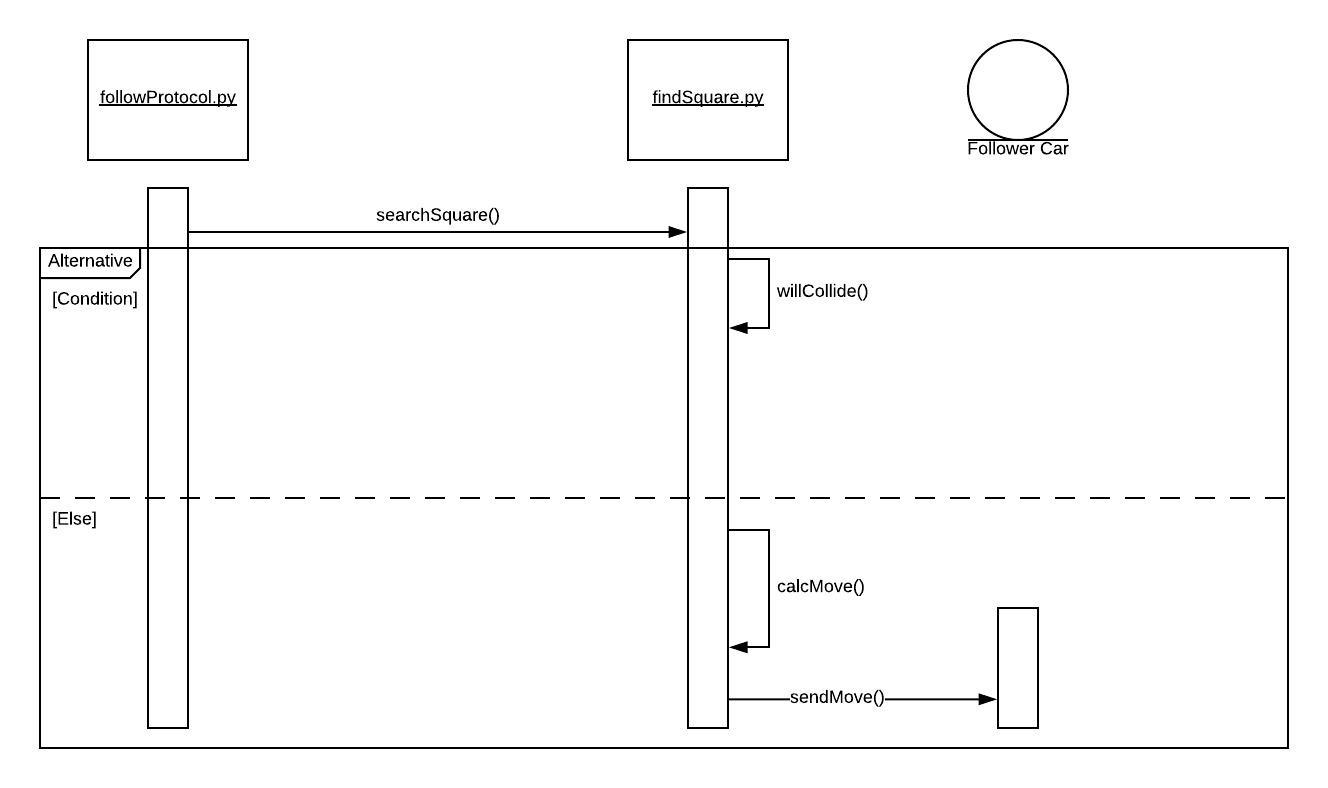
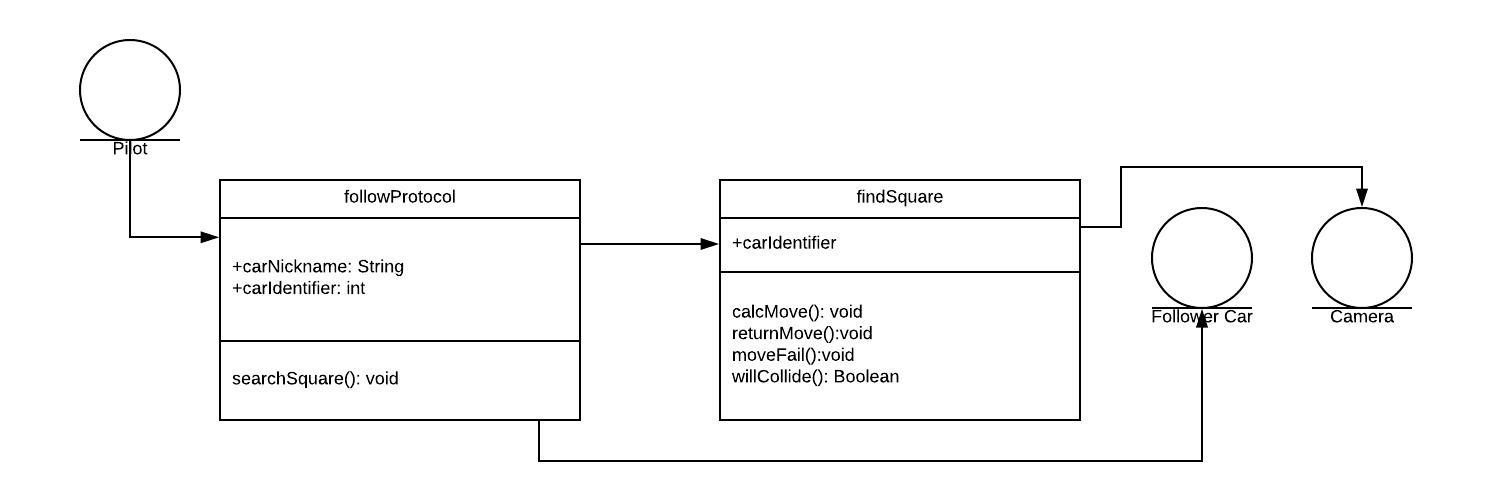
1. Registration



2 Leader Control.

3. Follow the Leader  
  


4. Line of sight Failure   
  


5. Collision Prevention  
  


7.1. Sequence Diagrams

7.2. Interface Specification

7.3. State Diagrams

8. System Architecture and System Design

8.1. Subsystems / Component / Design Pattern Identification

8.2. Mapping Subsystems to Hardware (Deployment Diagram)

8.3. Persistent Data Storage

8.4. Network Protocol

8.5. Global Control Flow

8.6. Hardware Requirement

9. Algorithms and Data Structures

9.1. Algorithms

9.2. Data Structures

10. User Interface Design and Implementation

10.1. User Interface Design

10.2. User Interface Implementation

11. Testing

11.1. Unit Test Architecture and Strategy/Framework

11.2. Unit Test Definition / Test Data Selection

11.3. System Test Specification

11.4. Test Reports per Spring

12. Project Management

12.1. Project Plan

12.2. Risk Management

13. References