Project Plan

1 General Information

1. Project Name: IGVC - Intelligent Ground Vehicle Competition
2. Team members:
    - Viet Dung Nguyen (CSE) (dnguyen2016@my.fit.edu)
    - Jinwen Zhang (jzhang2015@my.fit.edu)
    - John Light (jlight2016@my.fit.edu)
    - Sijin Yang (yangs2017@my.fit.edu)
    - Peter Tarsoly (ptarsoly2016@my.fit.edu)
3. Faculty Sponsor: Dr. Marius Silaghi
4. Client: Dr. Ken Gibbs
5. Meetings with the Client:

2 Goal and Motivation

The goal of the project is to build an unmanned autonomous robot to compete in IGVC in Michigan. The objective of the competition is to have the robot complete an outdoor obstacle course under a prescribe time within the speed limit of 1-5 mph while remaining on the lane and avoiding obstacles.

3 Approach:

The key features of the software components are:

- Lane detection
- Obstacle detection and avoidance
- Mapping
- Motion planning

The robot must be able to follow the path specified by the competition. The boundary of this path will be illustrated by dashed or continuous white lines. Lane detection is necessary for the robot to detect these boundaries.

Within the course, there will be natural and artificial obstacbles. Obstacle detection and avoidance allow the robot to detect obstacbles and move around them. Avoiding obstacles is a key factor of the competition.

Mapping let the robot construct a virtual map of the obstacle course using the data from lane detection and obstacle detection. With mapping, the robot can remember the collected data and avoid redundant data collection. In addition, the robot can remember the where it has been and avoid backtracking.

Motion planning is a crucial feature of the robot. Using motion planning, the robot can construct the shortest path to the checkpoints from the data illustrated in the map. Efficient motion planning is essential for finishing the course in time.

4 Technical Challenges:

- Team members have no experience with creating 3D environment in order to creat software simulation
- We need to decide on motion planning algorithm
- We need to find a way to detect obstacle

5 Milestone 4:

- Creating an emulation environment to test the software
- Test the software using the emulation

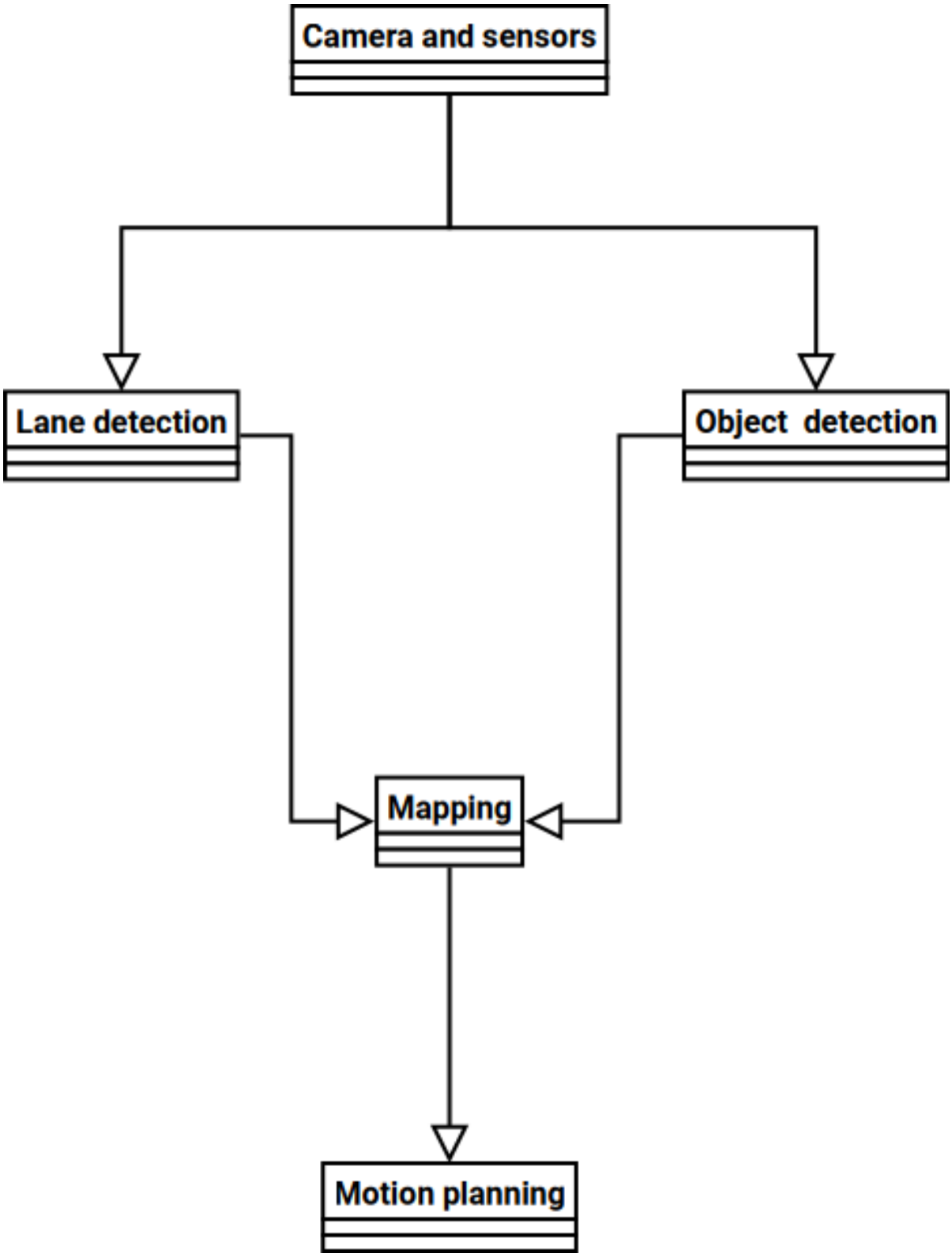
6 Milestone 5:

- Implement obstacle detection and motion planning
- Create poster for Senior design showcase

7 Milestone 6:

- Test/demo of the entire system
- Evaluation results
- Create user manual
- Create demo video

8 Design:



- All data collected by the camera will be processed and sent to the mapping module. Using the map, the robot's motion planning system will find a path to the destination
- The success of the project is defined by how the robot perform in the competition:

- Can the robot participate in the competition?
- Within the time robot, how far can the robot travel? Can the robot reach the goal.

9 Progress Summary:

Task	Completion %	Viet Dung	To do
Examine options for motion planning	50	50	Decide the algorithm
Implement and test lane detection	80	80	Improve the accuracy of the lane detec
Implement and test mapping	80	80	Require integration testing

10 Description:

Create a 3D simulation It is not possible to test all the software changes on the robot. Creating a simulation environment is necessary for testing.

11 Approval from Faculty Sponsor:

- I have discussed with the team and approve this project plan. I will evaluate the progress and assign a grade for each of the three milestones."

Signature

Date