Team Mobis

CSE 435

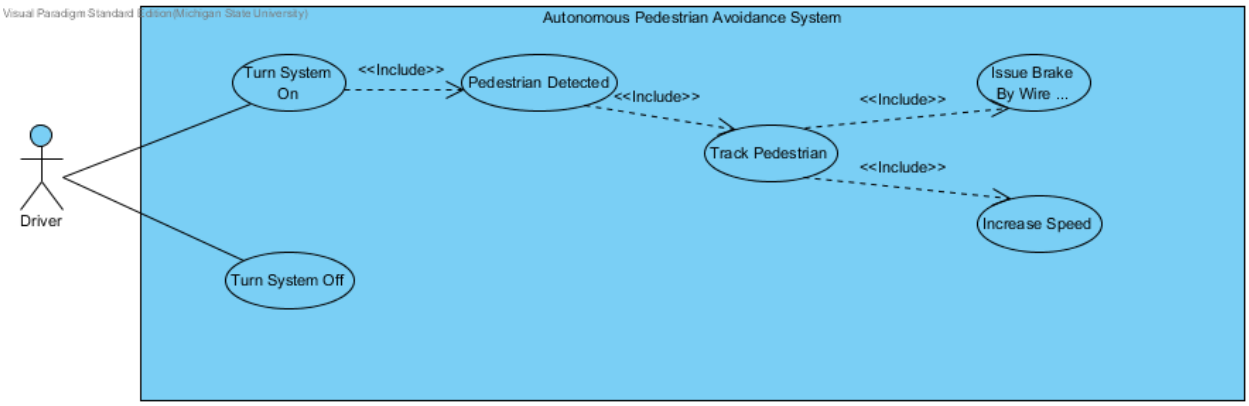
October 21, 2016

Project Specifications

Requirements:

1. There should be zero collisions resulting from the test cases given
    a. Reliably activate braking system when possible collision is detected
    b. Accurately calculate path of vehicle and identified pedestrians
    c. Check all identified pedestrians for possible collisions
    d. Avoid collisions with pedestrians even when they behave irregularly
2. Lost time should be minimized for all non-collision scenarios
3. Safety of vehicle occupants should be maintained
4. System should work under any foreseeable operating conditions
5. Fail Safe mode needs to be available, which compensates for an increased response time for deceleration

Use cases:



Use Case: Turn System On

Actors: Driver

Type: Primary and Essential

Description: The driver turns the system on either with the car ignition or manually. Perform pedestrian detection automatically.

Use Case: Pedestrian Detection

Actors: System (initiator)

Type: Secondary and Essential

Description: Stereo camera provides potential pedestrian detection where set vehicle speed is maintained until a hazard is detected. Track the pedestrian as long as they are in path of the vehicle.

Use Case: Track Pedestrian

Actors: System (initiator)

Type: Secondary and Essential

Description: Stereo camera provides real time tracking of where the pedestrian is and the velocity the pedestrian has relative to the car when a pedestrian is detected and remains within sight of the car. Issue break-by-wire requests and speed up requests based on safety and efficiency calculations.

Use Case: Issue Break-by-Wire Requests

Actors: System

Type: Secondary and Essential

Description: The system can issue requests to the car to apply breaks based on the pedestrian's movement and position. This is done in such a way to maximize efficiency.

Use Case: Increase Speed

Actors: System

Type: Secondary and Essential

Description: Upon the pedestrian being clear of the vehicle, the vehicle is issued requests by the system to speed back up to the original resting speed, maximizing comfort and efficiency while being safe.

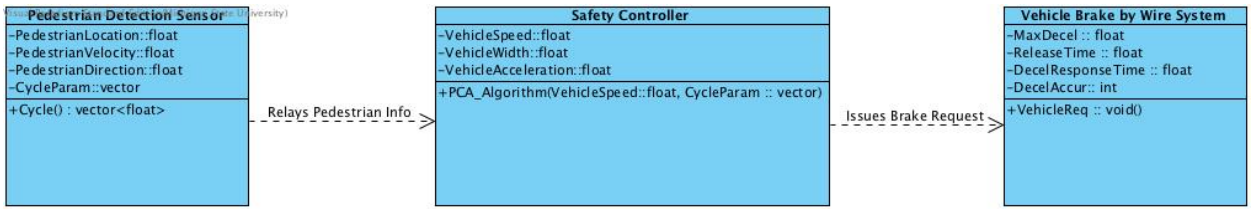
Use Case: Turn System Off

Actors: Driver

Type: Primary and Essential

Description: The driver turns the system off by shutting the car off or manually.

Conceptual Domain Model:



The model consists of 3 main components: Pedestrian Detection Sensor (stereo camera), Safety Controller, and the Vehicle Brake-By-Wire System. The Safety Controller will use sensor input and calculations against the vehicle width, speed, and acceleration to determine possibility of collision. This decision data is sent to the Brake-By-Wire System to perform the necessary actions to stop or maneuver the vehicle.

Questions:

1. Are there any systems already in place that we can take advantage of?
    a. Facial Recognition System
    b. Automatic braking
    c. Sensors (cameras, radar, etc…)
2. Should any other maneuvers be taken to try and avoid collisions other than braking
    a. Swerving
3. The system is Pedestrian Collision Avoidance but should we take into account other obstacles?
    a. Deer
    b. Debris
    c. Reckless drivers
4. What would you define as an emergency situation?
5. Should the system also attempt to avoid situations that could lead to emergency situations?
    a. Someone at a crosswalk walking but not in the road yet, braking could give more time to react if they step in the road but also could lead to false alarms
6. What speeds do you envision this systems working at?
    a. Highway vs residential
7. Do we want to automatically resume speed once the collision is avoided?
    a. A scenario where a pedestrian is still hit but fall down may lead to the car not detecting any further concerns of a collision, and a automatic speed resume could potentially injure them further
8. Can we make any assumptions about the pedestrians behavior or only base actions off of location/ movement?
9. What do you hope to get out of working with us?
    a. Deliverables
    b. Implementations