

Team APCA-1
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Intermediate Project Assignment 1

1. Create a name for your project and team.
Team Pedestrian Safety System
2. Roles assigned to the team members
Matt Tarnowsky – Project Manager
Ryan Burr – Project Facilitator
David Culham – Domain Expert/Customer Liaison/Security Manager
Bobak Shahidehpour – Artifacts Manager
3. Weekly meeting time and location for team.
Weekly Meetings – Thursdays at 5pm in 3353 Engineering Building
4. Create a skeletal website according to the assignment in the lecture notes.
Website is up and running at <https://www.msu.edu/~shahide1>
5. Find at least 3 resources that provide background information for your automotive system. For each, summarize the following information:
 - a. Unique feature(s) across the 3 sources
 - b. Constraints (e.g., platform, design, organizational, etc.)
 - c. Safety features described

1. Pedestrian Collision Avoidance Systems: A Survey of Computer Vision Based Recent Studies

Link: <http://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=05625077>

a) Unique features:

- Uses both a forward looking camera (FLC) and a forward looking radar (FLR).
- Data from these two sensors is fused in a separate control unit, Forward Sensing Module (FSM).
- Collision Warning with Full Auto Brake and Pedestrian Detection (CWAB-PD) will provide a warning and brake support when there is a

credible risk for an accident.

b) Constraints:

- The CWAB-PD applies maximum braking power resulting in decelerations of up to 10 m/s².
- The system would reduce speeds of 72.4 km/h to 47 km/h.

c) Safety features described:

- Full automatic emergency braking (up to 10 m/s²).
- Warning, brake support and automatic emergency braking in pedestrian accidents.
- Automatic collision avoidance.

2. Autonomous Pedestrian Collision Avoidance Using a Fuzzy Steering Controller

Link: http://hal.archives-ouvertes.fr/docs/00/73/76/39/PDF/Autonomous_Pedestrian_Collision_Avoidance_Using_a_Fuzzy_Steering_Controller.pdf

a) Unique features:

- Collision avoidance maneuver
 - A projection of a predefined route is computed with the object in the right lane
- Fuzzy steering controller
 - Responsible for managing the steering wheel in making a decision about modifying the autonomous vehicle's steering

b) Constraints:

- The car has to be moving on a straight road
- The pedestrian has to be located in the same lane
- The left lane has to be free and long enough for the pedestrian collision avoidance maneuver to be completed at the current speed

c) Safety features:

- Guidance or lane keeping
 - Tries to prevent lane departure by monitoring lane markers
- Lane change
 - Allows the vehicle to target a different lane and track the new path
- Overtaking
 - Sequence of a lane change maneuver, path tracking along

the new lane, and the return to the original lane

- **Collision avoidance**
 - **Prevents dangerous lane departure maneuvers**

Pedestrian Detection System Uses Wi-Fi

Link: <http://blog.caranddriver.com/gm-looking-to-add-wi-fi-direct-based-pedestrian-detection-system/>

a) Unique feature:

- **System is based on Wi-Fi Direct.**
 - **A technology that allows Wi-Fi devices to communicate with one another.**

b) Constraints:

- **If a pedestrian doesn't own a Wi-Fi Direct capable device — the driver will be responsible for avoiding the pedestrian.**
- **Not clear how the system will differentiate between a wireless device being carried by a pedestrian and being carried by other motorists.**
- **The Wi-Fi-based setup doesn't do much for younger kids who likely don't carry wireless devices around.**

c) Safety features:

- **A car can be equipped with Wi-Fi Direct-detection equipment that can determine the presence and proximity of devices equipped with the short-range wireless technology.**
- **This data stream can then be plugged into existing driver assistance technologies GM already offers to alert the driver of an errant pedestrian about to step out from behind a parked car.**