Domain Research Examples

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Example systems researched:

- Mercedes Benz Pre-Safe System
- Toyota Motor Corporation Pedestrian Avoidance
- Automotive Collision Avoidance System Field Operational Test by University of Michigan and General Motors. Available at: http://deepblue.lib.umich.edu/bitstream/handle/2027.42/49539/99798.pdf?sequence=1
- The Lexus Advanced Pre-Collision System. Available at: http://www.toyota.com/esq/pdf/The%202013%20LS%20Advanced%20Active%20Safety%20(2).pdf

Common features with APCA:

- All systems make use of front viewing radar systems to detect objects.
- All systems view an objects position and then decide if the car should decelerate or not.
- All systems track objects around them to aid in the decision making process. The algorithms for tracking will likely be similar.
- All systems strive for zero collisions

Differences with APCA:

- Some of the researched systems involve sending messages to the driver about imminent collisions with pedestrians.
- The researched examples deal with vehicles moving at different speeds while our project is set up to maintain one speed.
- Some systems have other onboard systems to interact with. Examples include a safety system that closes windows, tightens seatbelts and inclines power seats to avoid injury.
- The researched systems do not all bring the vehicle back up to speed after a collision is avoided.
- The system made by General Motors can be changed to suit the driver's preferences.
- Toyota's system helps the driver steer out of the way of collision while the student project focuses on breaking.
- The Lexus system has a maximum breaking power of approximately 1 G, while the APCA has a maximum breaking power of 0.7 G.

Questions for APCA project:

- Is the fail safe manually selected or is it supposed to be triggered by a set of conditions?
- Does the sensor have a range to how far ahead it can detect pedestrians?
- What happens in scenarios with more than one pedestrian?
- How will erratic pedestrian movement, such as changes in direction and speed effect the system?
- Should the system be able to notify the driver when a possible accident with a pedestrian is about to occur? How?
- What should the system do if the driver over-steers or under-steers in order to avoid collision?

- The average delay time for a pedestrian to go from static to moving is not a significant number, up to how many seconds delay should be considered?
- Could you please explain how the pedestrian sensor works in terms of when a signal is sent to start breaking to avoid collision (in meters)?
- Does the car go around the pedestrian? If so, how much distance does it keep ensure no collision occurs? And how does it determine what to do if there is another vehicle in the lane next to it? Do we have to consider that aspect?
- After automatically braking to avoid a collision, why does the vehicle velocity automatically return to the steady state velocity?
- How does the system take the non-ideal driving conditions (nighttime, icy roads, etc.) into account?
- How is the sensor affected by poor driving conditions (rain, snow, mud, etc.)?
- Will the system do anything to try and notify the pedestrian of potential collision (honk, flash lights, etc.)?
- What other automated systems will be competing for braking control?
- What happens if a pedestrian is obstructed from view until the vehicle is near?
- What about pedestrians travelling parallel to the road, such as people on bicycles?