**Functional Requirements**

1. Q: There are supposed to be 1 rear-view camera and 3 ultrasonic sensors integrated into the rear bumper of the vehicle. What possible configurations or positionings of these sensors do you think would be ideal?

A: We were thinking two sensors to the side and one towards the center so that we can also capture the range by the rear tires.

Q: So the two on the outside would be angled outward slightly?

A: Correct so that they can capture the area around the rear tires.

Q: What about the positioning of the camera?

A: The camera would be in the middle above or below the license plate.

Q: What kind of resolution for the camera would you like?

A: High resolution, like 720p.

Q: What about the viewing angle?

A: The camera should have a 180 degree viewing angle of the rear of the vehicle.

1. Q: What happens if the sensor scanning range is different than 70 meters?

A: As long as the sensor is capable of accurately recording obstacles at the first max rage (90cm) it is acceptable.

1. Q: Requirement 6 states that the pedestrian backup system is not to conflict with other software components of the car, but some of the functionality of this system involves overriding other systems, such as taking control of the infotainment system screen and muting any playing audio. Can you explain what you mean by not conflicting with other software components?

A: If we were to use the brakes, it should be consistent to other components of the system that check the same condition.

Q: So if our pedestrian backup system is going to use other software components, such as the braking, it should adhere to any requirements that the braking system also has on it?

A: Yes, that is correct.

Q: So just to clarify, the pedestrian backup system will be given priority. For example, if the brake system has some default activity, but the pedestrian backup system issues a command, the braking system should accept the command from the pedestrian backup system, correct?

A: Yes, that is correct.

1. Q: According to requirement 12, the sensors measure distance between the vehicle and the objects. How do envision the system inform the driver those distance?

A: Text should be displayed on the screen.

Q: How would you like the text to be displayed?

A: The distance could appear on the object.

1. Q: What will be the size of this display?

A: We can use the standard size of the infotainment screen of the type of vehicle.

1. Q: Requirement 14 states that “all objects are displayed in the infotainment system with relative proximity”, can you explain the meaning of this?

A: We need the distance of each object between themselves and the vehicle. Each of these distance measurements need to be displayed on the screen. So if there are multiple objects, each has its own distance measurement.

Q: So for example, you have an object that is 5 feet away and an object that is 10 feet away. Both should be visible on the screen and you should see both of these distance measurements being displayed on the objects, correct?

A: Yes, both objects should have distance displayed on the screen.

1. Q: According to requirement 15, there will be an audio alert if any object is detected in the path. Is there any distance specification for that? How do you envision the audio alert?

A: The alert should start at 90cm.

Q: How do you envision this audio alert in terms frequency and what type of alert?

A: We want some kind of standard beeping alert. When the distance decreases the frequency should increase. We don’t have actual number requirements for the frequency. The alert should also get louder. So the frequency and the level of loudness should increase as the distance decreases.

Q: Do you want to specify anything for the frequency or the rate at which it increases.

A: It should go at a few times a second.

Q: Lets say at 90cm we beep at once per second and as we get to within a minimal threshold, we beep at 5 times a second. Would that be an acceptable range for your frequency?

A: Yes, that would be acceptable.

1. Q: When the vehicle detects an obstacle within 30cm and within the predicted driving path, the vehicle is supposed to come to a stop. What should the criteria for completing this stop be?

A: So when we reach 30cm a signal should be sent to the braking system to bring the vehicle to a stop.

Q: So we are initiating the braking at 30cm, that does not mean the vehicle will stop instantaneously. Do you want to set some stopping criteria, defining when the vehicle should be completely stopped by?

A: I think vehicle should be stopped by 30cm.

Q: So at what distance would you like to initiate braking at?

A: You need to know how long the braking will take to occur. This could be based off of the speed of the vehicle. Then the braking can occur at a point before 30cm so that the vehicle can be brought to a stop by 30cm.

1. Q: Requirement 22 says, in an override, the speed limitation will no longer be functional. What happens if the speed limit is active in case of an override?

A: When the override is active, all warning should still be given. The only difference is that the braking is not going to occur. Also there is no speed limitation on the vehicle.

**Non-Functional Requirements**

1. Q: How effective should the object detection algorithm be at both detecting various objects and identifying these objects as humans?

A: The algorithms should be able to always detect if an object is there. It does not have to be as accurate at detecting if the object is a human or not, let's say 80%.

Q: The system does not perform a different action based on if the object is detected as a human or not, correct?

A: The color that the object is highlighted in changes. Objects that are humans should be highlighted in red. Other objects should be highlighted in white.

Q: What about non-human moving objects, such as dogs and cats? Should they have a different color?

A: Only humans need to be highlighted in red. Everything else can be highlighted in white.

1. Q: A high resolution camera and infotainment screen are to be used for this system. What are your expectations for “high resolution”?

A: 720px is considered high resolution.

1. Q: Requirement 7 says about checksums. Because the system works in real time, should there be any constraints for the checksum based verification?

A: This is supposed to be an Implementation detail. Hence, it should be ignored from the requirements document.

1. Q: Requirement 9 addresses security threats. What type of threats are you most concerned about?

--: Initially, the client was not sure because the term ‘security threats’ was too general.

Q: How is the PBS system connected to networking systems of the vehicle?

A: It is not connected to networking components.

1. Q: Requirement 11 states that the system will be able to detect objects regardless of the weather conditions.

A: The camera should be self cleaning.

Q: Are there potential bounds for this requirement?

A: The detection system should work in different environment conditions such as rain, snow and dust.

Q: Are there some kinds of limitations or boundaries for the requirement?

A: In case visibility is less than 90 cm, the system may not able to detect objects.

Q: Are the detection accuracies same for all the expected weather conditions? If not, is it possible to provide an accuracy matrix?

--: We didn’t discuss this question due to time limitation.

**System Invariants**

1. Q: While this system is active, the infotainment screen and audio systems are being overridden and this system’s invariant is that it is not to be exited without 1 of 2 criteria happening. The driver can either press the override button or shift the vehicle out of reverse. What do you think should happen if a severe accident occurs while using this system and the driver is physically unable to meet either of the criteria for the system to exit?

A: In case of an emergency, the PBS should be able to override and take full functionality in case of extreme conditions or emergencies.