CSE 435 - LMS 3 - SRS Review Session 1 Notes and Summary:

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Section 1:

- Clear up use of abbreviations such as LMS
- Stay consistent with abbreviation use
- Define exactly what ”Prevent Unwanted Lane Changes means”
- Scope goes too far into Functionality, simplify it

Section 2:

- Provide a more detailed description between the relationship between the Camera System and the Image Processing System
- Define how the error handling is actually implemented
- Speed limitations and the Torque limitations need to be clearly defined values
- Try not to use language such as “appropriate” (2.5)
- Re-word 2.6 (“paying attention on the road”)
- Change the introduction section to be less wordy and more concise, don’t want to repeat organization
- Software typo, should be hardware
- General grammatical and writing style changes and updates
- Improve on wordy sentences and make things simpler and easier to understand
- Section 2.5, define that “space” is space in memory. Improve transition to the next sentence

Section 3:

- Define threshold values, torque, distance from center, distance to lanes, etc.
- Update formatting (some bullet points have a period while others don’t)
- Sections are vague, for example, what does it mean for the system to be on versus enabled
- What counts as an essential alert?
- The system requires functional blinkers feels more like a dependency than a requirement
- Expand on “Do not annoy the driver with too many unnecessary alerts”, what exactly does this mean?
- What does it mean that the system should “always be ready to relinquish control to the driver”?

Section 4:

- **4.1**
    - No outside actors. Need to be included in future iterations of the diagrams
    - User and LDWS are mentioned in use case descriptions but they are not in the diagram
    - Add more context as to why these constraints are in place
- **4.2**
    - Expand on the methods and variables and include descriptions of what the methods and variables do
    - Include a variable somewhere that holds the state of the blinkers
    - Should the Supervisory Control System be connected to the Lane Management System?
        - Confusion on how LCS, LDWS, and LKS interact
        - **Shouldn't all the other subsystems belong to the Supervisory Control System?**
            - Data can be fed to the Supervisory Control System and the data is fed from there to the other subsystems.
            - This also allows the Supervisory Control System to control over the other subsystems
- **4.3**
    - Diagrams look good but the descriptions need to be more in-depth
    - Why is the LDWS interacting with all the other subsystems?
        - Would be better if changes to Supervisory Control System
        - Also add more guard statements
    - Don't need the "English Description:" header before the description of the diagram

Section 5:

- Prototype needs to show more functionality
    - Include more UI for alerts, etc.
    - Include more functionality for how the user interacts with the LMS
- Fix the prototype so that the car doesn't leave the lane on curves
- Include controls list so that the user of the prototype actually knows how to use our prototype
- As of right now the LMS doesn't turn off when the car comes to a stop after having reached 35 mph
- Include better descriptions of the scenarios.

Section 6:

- Missing link on second reference

General Notes:

- Clean up grammar (Give the document a few read overs and clean up mistakes)
- Clean up wordy sentences and things that are worded confusingly
- Develop LDWS, LCS, and LKS more
- Clearly define torque minimums, maximums, and default value
- Define the difference between enabled vs on and disabled vs off (being totally completely off or in a passive state?)
- Clearly define what necessary warnings are (and how many warnings being pushed to the driver are too many)
- Clearly define what the speed limitations on system functionality are

Summary:

The style of the meeting was a round-robin in which the Project Manager asked each reviewer their opinions, notes, and questions on each section.

The meeting started by covering Section 1 of the SRS document. The main point discussed was cleaning up this section of the document. Cleaning up includes fixing typos and grammatical errors throughout the entire document along with fixing consistency throughout the document. Consistency refers to changing all instances of phrases such as “the system”, “the LMS”, or “the Lane Management System” to one phrase for the entire SRS. The same consistency goes for phrases such as “the user” or “the driver”. Finally, discussed for Section 1, it was recommended that we slim down the scope section as it dives too much into functionality. We plan on fixing that to reduce the redundancy of the document.

Next, the review team covered Section 2. Apart from the general grammatical, writing style, and typographical errors mentioned by the team, the primary highlight from this section was to improve our specificity of what things mean. For example, it was suggested that we clearly define how error handling is implemented, how the Image Processing System talks with the Camera Subsystem, and what the speed and torque values actually are. This is something that we agreed with the reviewers on as the biggest takeaway from this section as these values and concepts need to be known for the SRS to accurately describe the system.

When it came to Section 3, clarification was the big takeaway again. It was recommended that we clarify limitations on the system such as how much speed and torque the LMS can actually apply. Along with making sure that all language used is as simple as possible without leaving out key information to avoid confusion.

Section 4 is where some of our biggest changes need to be made for our next iteration. Most importantly the Use Case Diagram lacks external actors whereas the

descriptions of the diagrams include them. So the diagram needs to be updated. Next, the class diagram was discussed in which the primary suggestion was that we updated the descriptions of the methods and variables so that the system's functionality was easier to understand. It was also recommended that we change the arrows on the supervisory control system so that the other subsystems belong to the supervisory system as opposed to the other way we have it set up. Finally, the Sequence Diagrams were covered. It was suggested that we improve upon the description of the diagrams because overall the reviewers thought they were adequate. It was also recommended that we add more guard statements, which is something we plan to implement in order to improve the safety aspects of the system.

The last section discussed by the team with substantial suggestions and notes was Section 5. Overall, the review team was happy with our current prototype but had a number of suggestions on how to improve it. First, they suggested that we implement more UI features so that it's clearer what exactly is going on in the prototype. Things such as how fast the vehicle is going, what warnings the LMS is pushing to the user, what kind of corrections the LMS is making, and UI that allows the user to customize the LMS. Finally, they recommended that we fix a few bugs that they found while testing the prototype. The two bugs that stood out were that when the vehicle gets up to speed (35 mph), the LMS turns on, but once the vehicle comes to a stop (after having been at 35 mph), the LMS does not turn off and the if the vehicle makes it outside of the lane markings when correcting on a curve, the vehicle gets stuck on the outer lane and can occasionally end up using the lane marking that is supposed to be on the left as the lane on the right side of the vehicle. These bugs are something we need to fix for the next iteration of the prototype as they impede the accurate representation of the LMS.

To end, we covered some general notes. Section 6 is missing a link on the second reference. Overall, we need to clearly establish within the document all of the limitations and specifications we discuss and reference. These limitations and specifications include what the speed maximums and minimums are, what the torque maximums, minimums, and defaults are, how LCS, LKS, and LDWS communicate with one another, how many warnings are to considered too many warnings that begin to "annoy the driver", and what the difference between the LMS being enabled vs the LMS being on (actively functioning vs being in a passive state). Finally, the reviewers re-iterated to us that we need to improve on the grammatical and consistency errors of the documents to really clean things up, to ensure that the document has one "voice".

The Plan for the Next Iteration:

- Overall, the grammar and the “voice” of the SRS needs to be improved and updated to sound as if it is coming from one person.
- The language needs to be uniform, meaning that there aren’t multiple phrases that mean the same thing. Phrases like “LMS” need to be used only as opposed to using “the system”, “the lane management system”, and ”The LMS” all together.
- Simplify the scope section of Section 1 as it delves too much into the system functionality (which is covered in a later part of the document)
- Discuss the LCS, LKS, & LDWS in the product functions
- The diagrams need to be updated
    - The Use Case diagram needs to include external actors
    - The Supervisory Control System in the Domain Model needs it’s relationships updated to reflect that it is the System in control over the others
    - Explanations of methods and variables need to be included on future iterations
- Specific Values and Constraints need to be clearly defined
    - Torque minimums, maximums, and default values need to be specified
    - Speed minimums and maximums need to be specified
    - Amount of alerts and notifications being pushed to the driver is considered “annoying”
    - Specify want is considered an essential alert and does not turn off regardless of whether or not the amount of “annoying alerts” has been crossed
    - Specify what it means to be enabled vs on and disabled vs off
        - Is the LMS completely off or just in a passive state waiting to be re-enabled?
- The Prototype needs to be updated
    - Include more UI as to show the user what is going on
        - When the LMS is correcting the vehicle position
        - When the LMS is pushing alerts/notifications to the user
        - Include UI to display speed on the vehicle
        - Include UI that showcases system customization (lower priority than the above three bullet points)
    - Fix current bug in the prototype in which the vehicle reaches 35mph, LMS activates, but when the vehicle comes to a stop or reaches a speed below 35mph, the LMS remains on

- Fix bug in which when the vehicle reaches a curve, the LMS doesn't correct enough and the vehicle ends up getting stuck outside of the lane or stuck on top of a lane marking