

Lane Management System Requirements

LMS3

1. The user should be able to correct the system and manually activate and deactivate the system.
 - 1.1. The system will automatically become active after the vehicle reaches a minimum speed of 25 mph and an indication light will be present.
 - 1.2. The driver is able to deactivate the system if they choose not to use it.
 - 1.2.1. Users can deactivate the system with a button located on the steering wheel that will be illuminated when on and darkened when off.
 - 1.3. The driver is able to override the system if they believe there is a false alert.
 - 1.3.1. The driver can override lane corrections by continuing to adjust the wheel in the direction they want to travel.
2. The system shall have cameras in front and on the sides of the vehicle.
 - 2.1. The cameras are active after the vehicle has reached the system's minimum speed.
 - 2.2. The cameras will help to keep the vehicle in their lane by capturing pictures of the vehicle's positioning inside the lane and sending them to another subsystem for processing.
 - 2.3. If cameras are unable to detect lane markings, the system will turn off.
 - 2.3.1. The system will inform the user of it being deactivated by showing a message on the screen.
3. The system shall have an image processing subsystem to identify the lane marker.
 - 3.1. The subsystem uses the pictures from the exterior cameras to calculate the distance of the vehicle from the lane markers.
4. The system shall have sensors in front and on the sides of the vehicle.
 - 4.1. The sensors are active after the vehicle has reached the system's minimum speed.
 - 4.2. The sensors will help to detect the curvature of the road and determine the vehicle's speed.
 - 4.3. The sensors will keep the vehicle from changing lanes if there is a car in the lane it is trying to move into.
5. The system shall utilize the Lane Departure Warning Systems (LDWS) to implement a warning light, beeping, and vibrating seat feature under certain conditions.
 - 5.1. If the vehicle is too close to the lane markers, a warning light will appear on the dashboard to alert the driver.
 - 5.2. If the vehicle is veering over the lane markers, a beeping will occur until the vehicle is back in its lane.
 - 5.3. If the vehicle is veering over the lane markers, the driver's seat will vibrate until the vehicle is back in its lane.
 - 5.3.1. Purpose of the vibrating seat and not the steering wheel is if the driver is veering out of lane because their hands are not on the steering wheel.
6. The system shall utilize the Lane Keeping Systems (LKS) to implement lane corrections.

- 6.1. If the vehicle is veering over the lane markers, the system will correct the path the vehicle is traveling back into their lane.
- 6.2. This subsystem should not interfere with changing lanes when the lane is open and free of obstructions.
7. The system shall utilize the Lane Centering Systems (LCS) to keep the vehicle centered in the lane.
 - 7.1. Lane Centering is activated when the driver initiates cruise control.
 - 7.1.1. Subsystem is off when cruise control is turned off.
 - 7.2. This subsystem will use the information gathered from the image processing subsystem and GPS information to identify the lane markers.
 - 7.3. This subsystem utilizes the sensor's information to predict the path the vehicle is traveling.