## Assessment of Final Design

The final design meets the requirements set at the time of the proposal, in addition to introducing some new features. However, due to the limitations of the sensors, functionality of the system is compromised in certain situations. Based on the module level, and system level testing, these are the aspects of the design that were successful:

* In cases where the obstacle vehicle remains fully within the sensor’s range, the system is able to accurately calculate the relative speed, distance, and time remaining as initially required
* Danger levels are calculated according to time remaining calculations, and activate the steering lock successfully
* Due to the addition of an external sensor, the blind spot is fully covered
* The system is able to anticipate obstacles in the blind spot due to the primary sensor having a large range. This feature differentiates the system from similar products.
* The LCD screen effectively displays the essential information needed for the user to make an informed decision regarding lane changes
* The GUI plots the calculations in real time, and help user’s visualize the situation

However, there are various problems that need improving:

* Due to the implemented averaging algorithm, the response time of the system is slow. As a result, user feedback isn’t instant. This may be dangerous if the obstacle vehicle is moving at a much faster speed than the user vehicle.
* The system doesn’t behave well if the obstacle continuously enters and leaves the sensor’s range. This is a major issue when the obstacle is within the edge of the sensor’s range. This leads to unstable results, and unreliable user feedback.
* The steering lock feature is dangerous in real life situations
* The GUI, and the LCD screen has not been optimized to be user friendly
* Brightness, instead of frequency was used to indicate danger levels on the LED due to design restrictions. Brightness is often hard to differentiate, especially considering various lighting conditions

On a modular level, the following table describes the success of each module:

|  |  |  |
| --- | --- | --- |
| Module | Advantage | Disadvantage |
| Obstacle Detection/Anticipation | * Successfully calculates the distance, speed, and time remaining values | * Slow response time due to compensational averaging algorithm * Unpredictable behavior while the obstacle is on the edge of the sensor’s range |
| Output | * Accurate representation of microcontroller’s calculations, and meaningful warning messages | * Hard to distinguish brightness levels of the LED * The LCD screen can be improved to provide more user friendly feedback |
| Automation | * Steering locks successfully according to time remaining calculations, and the presence of an obstacle in the blind spot | * Time remaining calculations are unreliable in non-ideal situations, and thus result in undesirable steering defects |