**Group Highlights**

The project is broken down into 3 distinct modules:

1: Obstacle Detection Module

Tanzim Mokammel ( TM ), with the assistance of Valikhan Kuparov (VK) were responsible for this module. The purpose of this module is to utilize the distance data from the sensors, and use it to perform relative speed, and time remaining calculations for determining danger levels, and notifying the user. The module is able to adequately perform these calculations within a certain degree of error (as shown in test results). A major challenge in this module was the treatment of noise on the sensor data. To overcome this, TM and VK implemented various averaging and sample and hold algorithms. The result is much more stable, though somewhat inaccurate and slow calculation of desired values. The module has been tested in cases where the sensor remains stationary, as well as where the sensor is mounted on the user vehicle. The mounting of the sensor required more aggressive averaging, and thus slower acquisition of data.

2. Output Module

VK, with the assistance of TM is responsible for this module. The LCD display is fully functional, and is able to display the distance, relative speed, and time remaining calculations from the microcontroller. The LED light has also been implemented, but it will use varying brightness levels, as opposed to blinking frequencies to represent danger levels. The reason for this is that blinking the LED requires delays to be added to the operation of the microcontroller, and this adversely affects the data acquisition of the sensor. In addition to the LCD screen and the LED, TM has designed an external GUI on a personal computer (PC) to remotely display all the relevant information to the user.

3. Automation Module

Hani Hadidi (HH), with the assistance of TM is responsible for this module. Complete control of the user vehicle has been implemented locally through the slave Arduino. In addition, the user is able to remotely control the car through the designed GUI. The module has also been integrated with the obstacle detection/anticipation module to have an operating steering lock function based on the danger level.