CS 437 Lab 1 Report

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1. A topology specifying the wiring of all your devices. (We recommend drawing the graph using [Fritzing](http://fritzing.org/download/) ([mirror](https://drive.google.com/file/d/1OcdSiroMfAKlM5QUd16NUFiSiALOJrNX/view?usp=sharing)) to show detailed wirings, including the choice of pins on the Pi.)
2. Your design considerations for each part of the lab
3. Anything you did not have time to show/mention in the demo video

Part 1 Design Considerations:

First, we used the current\_angle methodology used in the picar-4wd starter code to obtain an iteration of angles for the servo. We changed the maximum angle from 180 degrees to 90 degrees so that the ultrasonic sensor would only read distances that are in front of the car which made the object detection more accurate. Once we had the angle iterations, we used the get\_distance\_at function from the picar-4wd starter code with the provided angle to set the servo at the current angle and to get the ultrasonic sensor reading, or the distance, at the current angle. Once we had the distance, if the reading was under 20, we used while loops to make the car stop, move backward, and turn using the stop, backward, and turn\_right functions from the starter code. If the distance reading was over 20, we used the forward function to make the car continue forward. We decided on the number 20 by trying various distances and seeing which got the most accurate and consistent results. All of this was wrapped around a while true loop so that it would run indefinitely.

Part 2

1. *Would hardware acceleration help in image processing? Have the packages mentioned above leveraged it? If not, how could you properly leverage hardware acceleration?*
2. *Would multithreading help increase (or hurt) the performance of your program?*
3. *How would you choose the trade-off between frame rate and detection accuracy?*