Goal

- Create an internet-enabled device with a camera that is able to scan a parking lot and determine which spots are occupied and which are not
- Create a user friendly application/website that integrates with Google maps to show parking lot usage and display where unoccupied spaces are located

Motivations and Objectives

Motivations

- Introduce a platform that can be easily accessed to help drivers park faster. Also to provide a commercial/residential parking system to clients that is easy to management and cost efficient
- Reduce time driving which can lead to decreased carbon emissions
- Reduce parking lot accidents by decreasing the time spent looking for parking spots

Objectives

- Scan a parking lot using low cost hardware employed with computer vision software to determine the parking lot layout and available spots with impeccable accuracy
- Make data via an application and/or website

Challenges

- Installing/compiling all OpenCV packages properly on a unix-like operating system
- Avoiding false positives in inclement weather and low light
- Determining how the device should communicate with the app (phone/web)

Acknowledgement

- Vishal Patel
- Adrian Rosebrock – author of “Practical Python and OpenCV”

Methodology

- A camera module is connected to a Raspberry Pi which will take images of the parking lot at a set frequency. It then uses OpenCV, NumPy, and a custom python program. This system will take the image provided by the camera module and determine which parking spots are available
- After the image processing, the Raspberry Pi will format the data of available spots and send that information to our server
- The user will then connect to our server and provide the necessary information in a user friendly manner

Results

- The python algorithm generates a gray-scale histogram for each parking space and then compares that histogram to a histogram of bare asphalt. The algorithm is predominantly looking for differences between the histograms – this in turn calculates which spots are occupied/unoccupied
- Each parking spot contains a score number – the lower the score the more it is similar to the gray-scale histogram of the asphalt sample. Higher scores are less similar to the asphalt sample, in the case above, we have the threshold set at 550, meaning that any parking spot that has a score greater than the threshold will be marked as occupied

References