Parking Problem Requirements Doc

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1 Project Description

1.1 The Problem

Anyone who has tried to find a parking space in the Brown University area has undoubtedly spent at least 5 minutes driving around attempting to find a free parking space. The idea behind this project is to solve that problem by allowing users with a cell phone, PDA or other internet enabled device to access a webpage where they can find out the location of a close and available parking space.

1.2 Goals

The goals for this application are as follows:

- To setup and program cameras in parking areas such that the cameras can detect whether or not parking spaces are occupied by cars.
- To relay this information to a central database on a server, which can be queried for information regarding the status of a given parking space.
- To have a webpage which users can access to determine where there is free parking.

1.3 Users

The intended users for this application are professors, students and anyone else who needs to park in the Brown University area. The users would also need to have a cell phone, PDA or other device that connects to the internet in order to access the website to determine available parking spaces.

2 Features

2.1 Mandatory Features

- Cameras
  - Must be able to process images such that a free parking space can be distinguished from one in use.
  - Must be able to work in varying conditions (day, night, rain, snow, other bad types of weather).
- Database

  - Should be able to store data about each parking space.
    * The space's status - used or free
    * What parking lot/parking area the space belongs to.
  - Should be able to keep track of all different parking areas.
  - An administrator should be able to add and remove parking areas.
- Security
  - The database should be modifiable only by administrators.
  - There should be an authentication method for verifying administrators.
- User Interface - Web Site
  - Users should be able to query about the status of a parking area and be told that either:
    * there are no free parking spaces available in that parking area, OR
    * there are some free parking spaces and they will also be given the number of free spaces.

2.2 Wish List

- Cameras should be able to work together with other cameras in a system. (high)
- To have the webpage respond with the parking space closest to the user's destination instead of forcing the user to query about specific parking areas (medium).
- To incorporate parking permits for use with the parking lots on campus (low). This would require:
  - Having users logon with an ID.
  - Keeping track of which users have permits to which lots in the databases.
  - Having a way to add and remove permits for various users (usable only by administrators).

3 Potential Risks and Pitfalls

- Installing weather proof cameras is costly
- Interfacing with cameras could be difficult. Prof. Taubin of the engineering department has offered to let us use the software developed by engineering students last semester (Fall 2004) in order to retrieve information from the cameras.

- The image processing could prove to be tricky. However, Prof. John Hughes of the Computer Science Department has said that he does not believe it would be that difficult, particuarly with multiple cameras.

4 Testing

Testing could be accomplished by setting up a few cameras to monitor one parking lot or street block. From there one could make sure the system works before installing it in several parking lots. The system would also have to be tested to make sure that it can handle many users accessing the website at once. This testing is in addition to the testing that is expected to be done by the programmers to ensure basic functionality and correctness.