Senior Design Project

Progress Report

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Introduction

Handicapped parking abuse is a major issue affecting the lives of approximately 72% of those who rely on private automobile for their transportation. Researches have shown that inappropriate use of handicapped parking spots occur frequently, with consistent reports indicating that most of these parked cars in the reserved spaces are parked there illegally (Tierney, 2002).

Problem Statement

The purpose of this project is to prevent the abuse of handicapped parking by checking the eligibility of the vehicle and allowing those who only deserve this parking to use the reserved spots. Also, the system is also expected to inform users at the parking entrance of the availability of handicapped parking lots.

Project Specifications

User Requirements

- Allow only eligible people to use the parking spot.
- Show the number of empty handicapped spots at the entrance of the parking.
- Ability to issue temporary permits to use handicapped spots.

Technical Requirements

- MAX 1KB Passive RFID tags issued for handicapped people.
- The tag contains information about the user and expiration date.
- RFID antenna with a range of 4-6 meters.
- Ultrasonic proximity sensor to detect empty spots.
- Blocking arm to secure the spot.

Task Schedule

Task ID	Task Name	Owner	Status	Duration\ Week
1.1	Collect information about the current methods.	Mohammad	Done	
1.2	Study all possible blocking techniques.	Rami	Done	
1.3	Study all possible identification/ authorization techniques.	Yazan	Done	1
1.4	Choosing the suitable parts. Order required parts.	Group	Done	

Table 1: Analysis Phase: 1 Week (Leader: Rami)

Task ID	Task Name	Owner	Status	Duration\ Week
2.1	Design identification sub-system.		Done	
2.1.A	User-related parts.	Yazan	Done	
2.1.B	Parking-related parts.		Done	2
2.2	Design the blocking sub-system.	Rami	Done	
2.3	Design empty-spots-counting sub-system.	Mohammad	In Progress	
2.4	Testing compatibility.	Group	In Progress	1

Table 2: Design Phase: 3 Weeks (Leader: Mohammad)

Task ID	Task Name	Owner	Status	Duration\ Week
3.1	Implement identification sub-system.	Yazan	In Progress	
3.2	Implement blocking sub-system.	Rami	In Progress	2
3.3	Implement counting sub-system.	Mohammad	waiting	
3.4	Integration and testing.	Group	waiting	3
3.5	Fixing issues and retesting.	Group	waiting	

Table 3: Implementation Phase: 5 Weeks (Leader: Yazan)

- *Implementing counting sub-system* is waiting for the task of designing the *empty-spots-counting sub-system* to be completed.
- *Integrating and testing* task is waiting for the implementation tasks to be completed.
- *Fixing issues and retesting* task waiting for the *integration and testing* task to be done.

Completed Tasks

The first task in the analysis phase is collect information about the current methods to identify the handicapped parking spot and how the authorization for this parking sport done. It was performed by searching on the Internet for current method to preserve the spot for allowed people only. Some solutions were found but they were inefficient and lacked the automation part.

The Second task (*Study all possible blocking techniques*) was done by researching for all the available blocking techniques in the market. The research resulted in finding four different types of blocking techniques that differ in method, cost, implementation and compatibility. Based on a comparison between the four available possible solutions, one solution was decided to be used due to its compatibility with the system and its ease of use. The comparison process is shown in Table 4.

Blocking Method	Pros	Cons
Parking space guard (**Figure 1**)	• Integrated radio receiver • Handheld radio transmitter • solar technology (outdoor) • one way blocking (with sensors)	• solar technology (indoor) • ii. Easy to break.
Electro-Hydraulic Spike Barrier /Tire Killer (**Figure 2**)	• One way blocking • ii. Fast in blocking and unblocking	• Cause crucial damage to the car in case not working • ii. Not cheap.
Electro-hydraulically Blocking Bollards (**Figure 3**)	• Durable • ii. High impact resistance	• Cause crucial damage to the car is the system fails • Costly
Parking Post (**Figure 4**)	• Cheap • Automatic Remote Control	• Works on batteries • Need to be charged in (3-6) months

Table 4: Blocking Systems Comparisons

Figure 1: Parking space guard

Figure 2: Electro-Hydraulic Spike Barrier /Tire Killer

Figure 3: Electro-hydraulically Blocking Bollards

Figure 4: Parking Post

The Third task (*Study all possible identification/ authorization techniques.*) was done by researching for all the available identification techniques in the market. The research resulted in finding four different types of identification techniques that differ in security, range, complexity, implementation, compatibility and cost. Based on a comparison between the four available possible solutions, one solution was decided to be used due to its cheapness, proper range and decent security. The comparison process is shown in Table 5.

Identification System	Pros	Cons
License Plate Recognition (LPR)	• Hard to forge (secure).	• Hard to implement. • Line of sight is needed. • One sensor per parking spot.
Passive RFID	• Cheap. • Easy to use. • Has security (challenge and response).	• Detection problems. • Range and interference issues.
Active RFID	• Better detection than passive RFID • Longer range • Higher security	• Long range (not used, and can cause interference). • Costly • Battery dependent.
QR code	• Extremely cheap.	• Easy to forge. • No security • Line of sight is needed.

Table 5: Identification Systems Comparisons