UNIVERSITY OF CAPE TOWN
IYUNIVESITHI YASEKAPA • UNIVERSITEIT VAN KAAPSTAD

Faculty of Engineering and the Built Environment
Department of Electrical Engineering

EEE4036A

Design Project (Team 14)

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12th March 2016

Contents

1 Plagiarism Declaration

DECLARATION:

1. I know that plagiarism is wrong. Plagiarism is to use anothers work and to pretend that it is ones own.
2. I have not allowed, and will not allow, anyone to copy my work with the intention of passing it off as his or her own work.
3. This assignment is my own work. I have not used the material in this assignment in any of my other assignments.
4. I have included internet article, book, or other material references used for this assignment.

Signed: Benjamin Scholtz (SCHBEN011), Jarushen Govender (GVNJAR002), Isaac Lebogang Khobo (KHBISA001), Nasko Stavrev (STVATA001)

Date: 12th March 2016

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2 TASK CLARIFICATION

2.1 Background

UCT Upper campus has a number of parking areas for staff, students and visitors using cars to travel to campus. There are red, yellow, blue and unmarked bays on campus. In addition there are disabled and visitor parking bays on campus. These categories are assigned the highest priority.

For every user, a parking category is assigned, and an associated annual fee is charged. The purchase of a parking disk allows the staff member/student/visitor to search for a parking spot in the designated category on campus, but it is not guaranteed that one will be available, since parking bays are oversold. When arriving on campus, a driver of a car may spend some time searching for an available spot in the required category. Parking disks are generally linked to a person and only valid for the specific vehicle for which the disk has been purchased, except for student lift clubs.

The Traffic Department on Upper Campus administrates and manages all aspects related to parking of vehicles. [1]

2.2 Problem Statement

For a driver entering Upper Campus in a car, it is not immediately apparent where there are parking bays available. This is a particular problem during peak times when a large number of cars arrive on campus, looking for parking at the same time. The design assignment is to solve this problem using the electrical engineering skills of each of the team members in your group. [1]

The design assignment is:

- To provide information in an easily accessible format, to each driver of a car immediately on arrival on campus, on where all the vacant parking bays on campus are. This must be for the specific category of parking for this user.
- To determine whether a vehicle is parked on a bay not designated for this user, for example a yellow disk holder parks on a red bay, or a visitor parks on a disabled parking bay, and make this available to the traffic department in real time.
- To allow electronic reconfiguration of traffic bay allocations on special occasions, for example during the summer school period, when there are many visitors requiring parking on campus.
- To monitor and log the use of parking bays and the percentage of occupation of each parking area and make this available to the traffic department, for the purpose of planning. [1]

3 DESIGN SPECIFICATION

3.1 Scope

3.2 Applicable Documents

3.3 Characteristics

3.3.1 Functional Characteristics

Function 1
Function 2
Interface Characteristics

3.3.2 Quality Assurance

Standards and Codes
Methods of Testing
Reliability Issues

3.3.3 Timescale

Design Schedule
Development Schedule
Production Schedule
Delivery Schedule

3.3.4 Economic Factors

Market Analysis
Design Costs
Development, Manufacturing, Distribution Costs

3.3.5 Ergonomic Factors

User needs
Ergonomics

Controls

3.3.6 Life-cycle

Distribution
Operation
Maintenance
Disposal

3.4 Acceptance Test Requirements

Function Test Requirements
Test methods: Could be by inspection, theoretical modelling, simulation, laboratory functional demonstration, field trials, in-service measurements, etc.

4 CONCEPTUAL DESIGN

4.1 Design One

4.1.1 System Diagram

4.1.2 System Components

4.1.3 Requirement Satisfaction

4.1.4 Evaluation

Cost
(implementation, maintenance, energy consumption)
Strong/weak Points

4.1.5 Risk Assessment

External Causes
(weather, vehicle impact, human interference)
Intended Life
risk of failure during intended life
Mitigation
mitigation (steps you will take to reduce the risk)

4.2 Design Two

4.2.1 System Diagram

4.2.2 System Components

4.2.3 Requirement Satisfaction

4.2.4 Evaluation

Cost
(implementation, maintenance, energy consumption)
Strong/weak Points

4.2.5 Risk Assessment

External Causes
(weather, vehicle impact, human interference)
Intended Life
risk of failure during intended life
Mitigation
mitigation (steps you will take to reduce the risk)

4.3 Weighted Selection

4.4 Recommendation

Brief section describing what the recommended action is.

5 EMBODIMENT DESIGN

5.1 System Overview

5.1.1 System Description

5.1.2 System Diagram

5.2 System Analysis

Analysis of system operation, interfaces, use etc.

5.3 Software Design

5.4 Mechanical Design

5.4.1 Mechanical Requirements

Durability, forces, dynamics.

5.4.2 Technical Drawings

5.5 Electrical Design

5.5.1 Power Requirements

Battery life etc.

5.5.2 Schematics

5.6 Assumptions

Identify and show that checked validity.

5.7 Failure Modes

Probabilities,Consequences,Mitigation

5.8 System Lifetime

A statement of the design life time, with explanation of what (if anything) will limit it.

5.9 Worst Case Calculation

For at least one component / sub-system

References

[1] Riana Geschke. (2016, February) EEE4036A Electrical Engineering Design 2016. [Online]. Available: Private