University of Glasgow | School of Computing Science

ESE3: Chose Your Own

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Abstract

The abstract goes here

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Contents

Chapter 1

Introduction

1.1 Introduction

This document is the final submission for Team Project 3, as part of the Electronic and Software Engineering degree program at the University of Glasgow. The project takes a specification from a client and involves the design and creation of wireless weighing system (WWS) for UGRacing's car.

The WWS 1.1 takes the form of a simple wireless network, comprising of a number of sensors and a master unit. The master unit will act as an access point allowing any number of handheld units, whether tablets or smartphones, to view the data from each 'Scale Unit'.

1.2 Background

UGR is a group of students competing in a competition called Formula Student. This is a world wide competition run by university groups with 100 entrants from 34 countries (numbers taken from the Formula Student 2012 competition) carried out every year; the goal of each group is to create a single seat race car that competes against the other groups at the Silverstone Grand Prix track in June/July.

The cars produced are assessed on a number of attributes including: handling, robustness, speed and acceleration.

1.3 Motivation

UGRacing needed a way to measure the weight of each wheel in order to optimize the weight distribution of the car. The team are currently using standard bathroom scales to measure the weight distrobution of the car. Being highly unpractical UGRacing require a solution that is safe, accurate and portable. The creation of a wireless system will allow all readings to be viewed by a generic

handheld unit. Using a wireless system will also reduce the number of potential trip hazards in the workshop.

Chapter 2

Requirements

2.1 Requirements

2.1.1 Requirements Gathering

The primary mode of requirements gathering has been conducted via meetings with a UGR liason Jonathan Siviter. Multiple meetings with the liason were carried out after more questions became apparent further down the line of production, email corresondence was also required when we had only simple requests.

2.1.2 System Requirements

The basic premise of the project is that there would be 4 ramps each leading to a platform that would sit one of the 4 wheels of the car. Each platform would be a load cell that would produce an electric current based on the force applied to it. Our job would be to translate this current into a weight and then convey that information to the user wirelessly. In our first meeting with the UGR liason we were able to make a list of functional and non-functional requirements.

Functional Requirements

- The system must be wireless.
- Each wheel must be weighed simultaniously.
- Basic data analysis such as differential weights must be available.
- Accuracy should be $<$1kg.
- Wireless system must work to a range of 5-10 meters.
- Max expected total load 300kg.

Non-Functional Requirements

- The system should be able to display the readings to a generic device such as an iphone, android phone or tablet.
- There should be a button to initialise readings.
- System must be portable.
- System must be compatible with the load cells that would be produced by a different team.
- Each of the scale control units should be roughly 25cm^2.
- Scale unit meet IP65 requirements(dust sealed, resistant to low powered jets of water from all directions).
- The scale units should be battery powered, using common batteries (coin cells or AAA).
- There should be a physical on-off switch at each unit.

Chapter 3

Design

3.1 Design Overview

The proposed solution is to have 4 simple scale units. These units will simply recieve the analogue signal from a loadcell, convert it into an integer in digital form and then send that to a central unit via a wireless communication module. The central unit will recieve messages containing the weight from each of the 4 different scale units. It will then need to provide this information to a user in a standardised way in order to make it accessible from a generic device as required (see sec**??**. See fig **??** for a block diagram of the prosed design.

3.1.1 Scale Units

These units are where the majority of the work is done, they are essentially load cell control units. This means that they are the responsible for interfacing to the base analogue output of the load cell, configuring it to a manageable form and then transmitting it to the central unit. This will require several components cheifly some form of microcontroller with an ADC, a wirelss communication device, a circuit that travels through a load cell into a wheatstone bridge and then into instrumentation amplifier in order to increase accuracy.

3.1.2 Central Unit

This is the central hub of the system; where all the information is brought together, analysed and provideded to the user of the system. This component will need a microcontroller and a wireless communication device capable of communicating with all 4 of the scale units. It will then need to provide this information to a user in a standardised way in order to make it accessible from a generic device as required”

3.2 Hardware Design

Chapter 4

Implementation

4.1 User Interface

4.1.1 Foo

4.2 Database Model

1. Blah blah blah
2. Blah blah blah
3. Blah blah blah
4. Blah blah blah

Chapter 5

Evaluation

Chapter 6

Conclusion

A great project!

6.1 Contributions

Here we explain that Lewis Carroll wrote chapter 1. John Wayne was out riding his horse every day and didn't do anything. Marilyn Monroe was great at getting the requirements specification and coordinating the writing of the report. Betty Davis did the coding of the kernel of the project, described in Chapter 4. James Dean handled the multimedia content of the project.