University of Glasgow | School of Computing Science

ESE3: Chose Your Own

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Level 3 Project — 18 March 2013

Abstract

The abstract goes here

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Contents

Chapter 1

Introduction

1.1 Introduction

This is the documentation for the Electronic and Software Engineering Level 3 Team Project for Team N. Out of the 3 ESE project proposals our team picked the ”Choose your own project” supervised by Dr. Martin Macauley.

It was suggested by Dr. Macauley that a group within the University may require something built for them and that this would create a real world evironment with a client and system requirements that were externally defined. The UGRacing team had previously given projects to previous teams and were therefore sought out for a source of a project. They requested that a wireless weighing system was built in order to measure the weight of the car that they were building over the course of the year.

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.

1.4 Requirements

This section details both how the requirements were gathered as well as what the requirements of the system were defined by.

1.4.1 Requirements Gathering

During the first meeting with the UGR liason Jonathan Siviter, the intial problem description was outlined along with motivations and background of the UGR. Once discovering what it was that UGR wanted built the project was accepted and meetings planned to gather further requirements.

Over the course of the project there has been one additional meeting in order to better detail the exact requirements of the system and continuous email correspondence once further questions became apparent.

1.4.2 System Requirements

The system requirements as defined by the UGR team's liason were split into 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 2

Design

2.1 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 a 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**??**.

2.1.1 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.

2.1.2 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”

2.2 Hardware Design

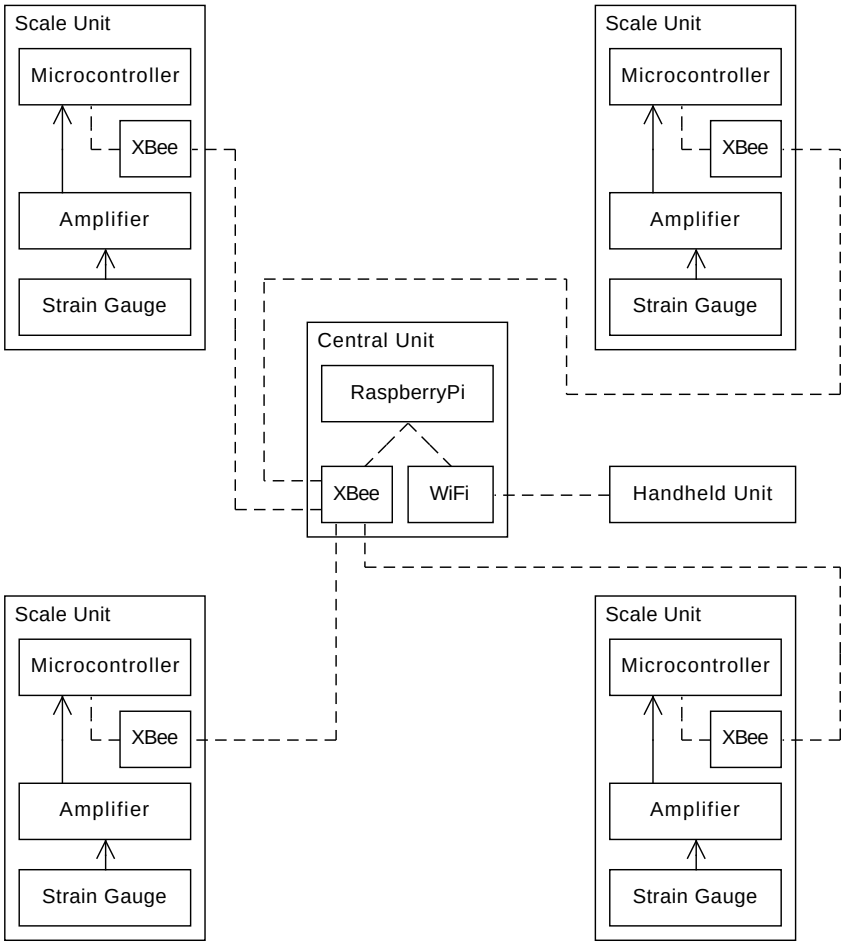

Figure 2.1: Block Diagram

Chapter 3

Implementation

3.1 User Interface

3.1.1 Foo

3.2 Database Model

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

Chapter 4

Evaluation

Chapter 5

Conclusion

A great project!

5.1 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 3. James Dean handled the multimedia content of the project.