Wireless Weighing System

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Background

- Who is UGRacing ?
- Why did they need our project ?
- Why did we take the project ?

Requirements

Functional

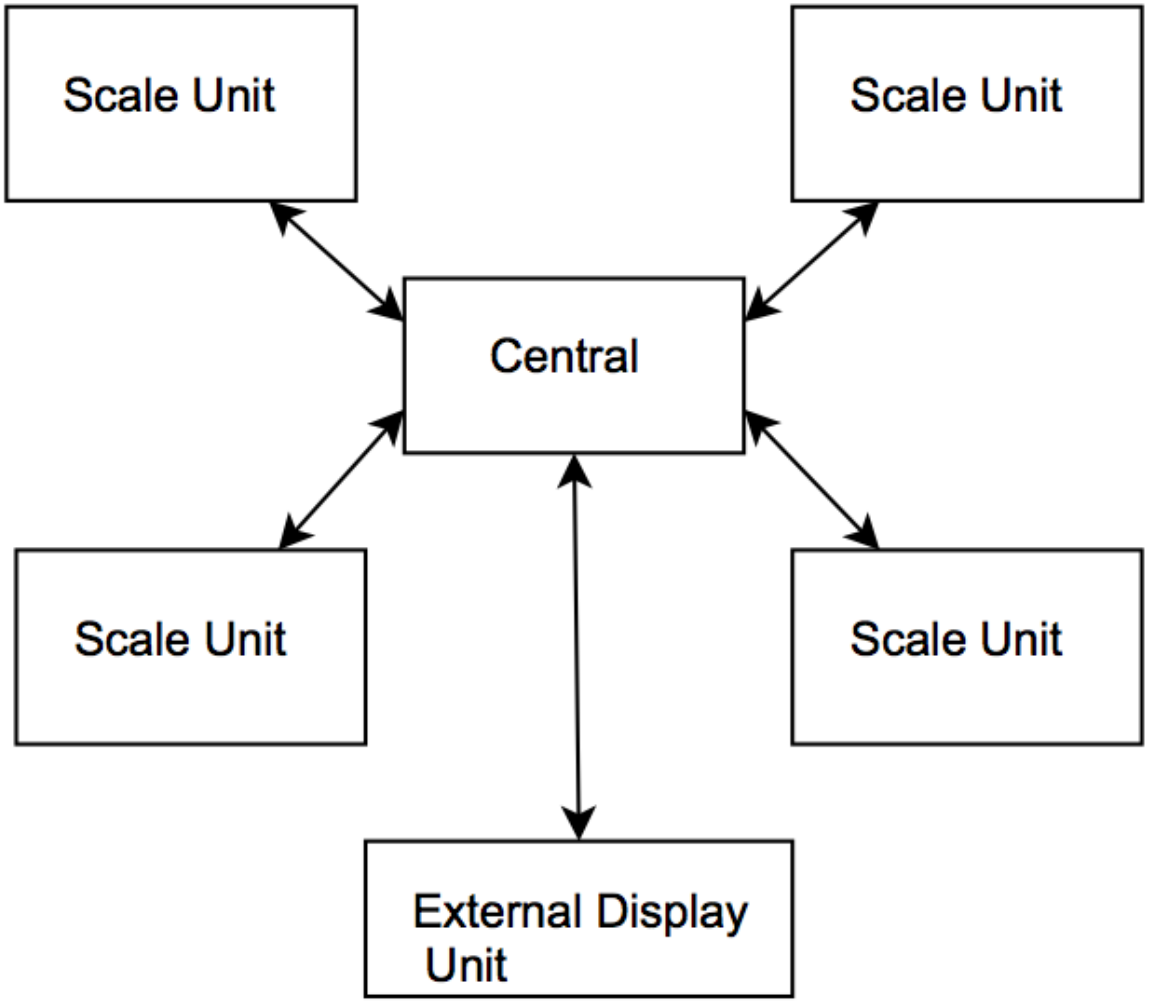
- The system must be wireless.
- Each wheel must be weighed simultaneously.
- Basic data analysis such as differential weights must be available.
- Accuracy should be < 1kg.
- Wireless system must work to a range of 5-10 meters.
- Max expected total load 250kg.

Requirements

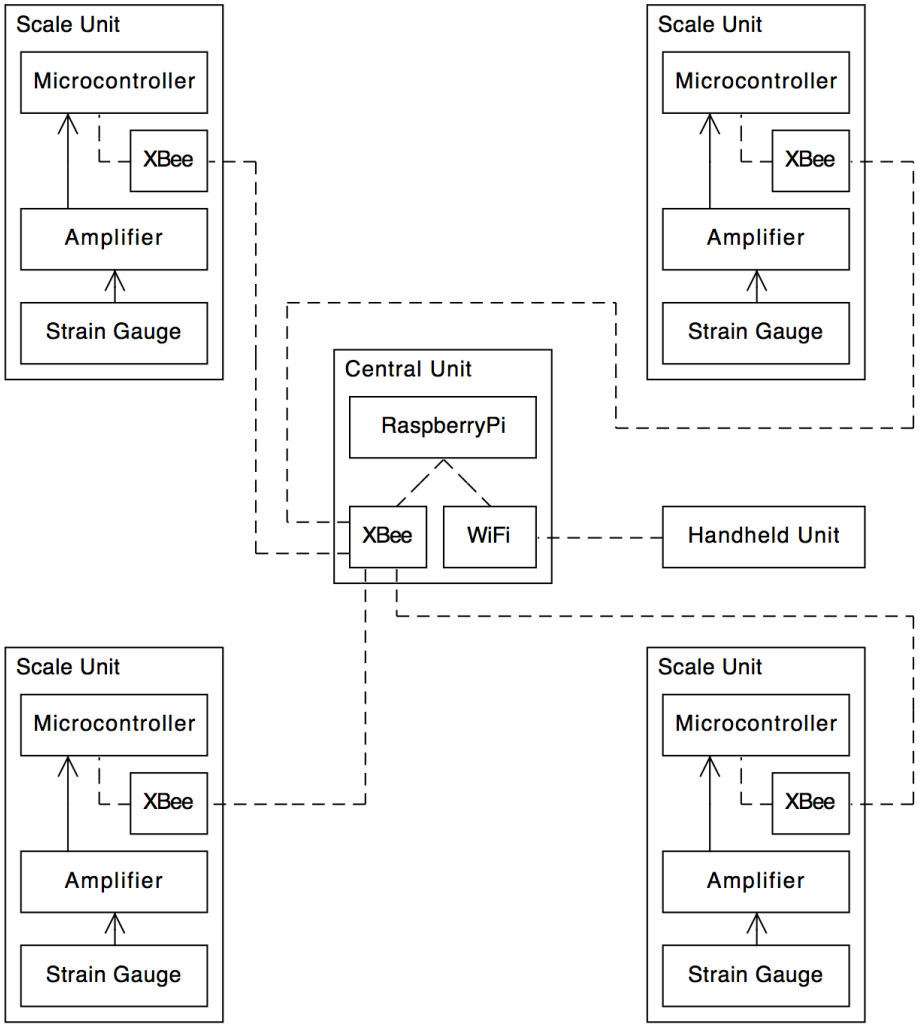
Non-Functional

- 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 25cm2.
- Scale Unit must meet IP65 requirements (dust sealed, resistant to low powered jets of water from all directions).
- The Scale Units should be battery powered, using batteries that are easily accessible from any shop selling batteries.
- There should be a physical on-off switch at each unit.

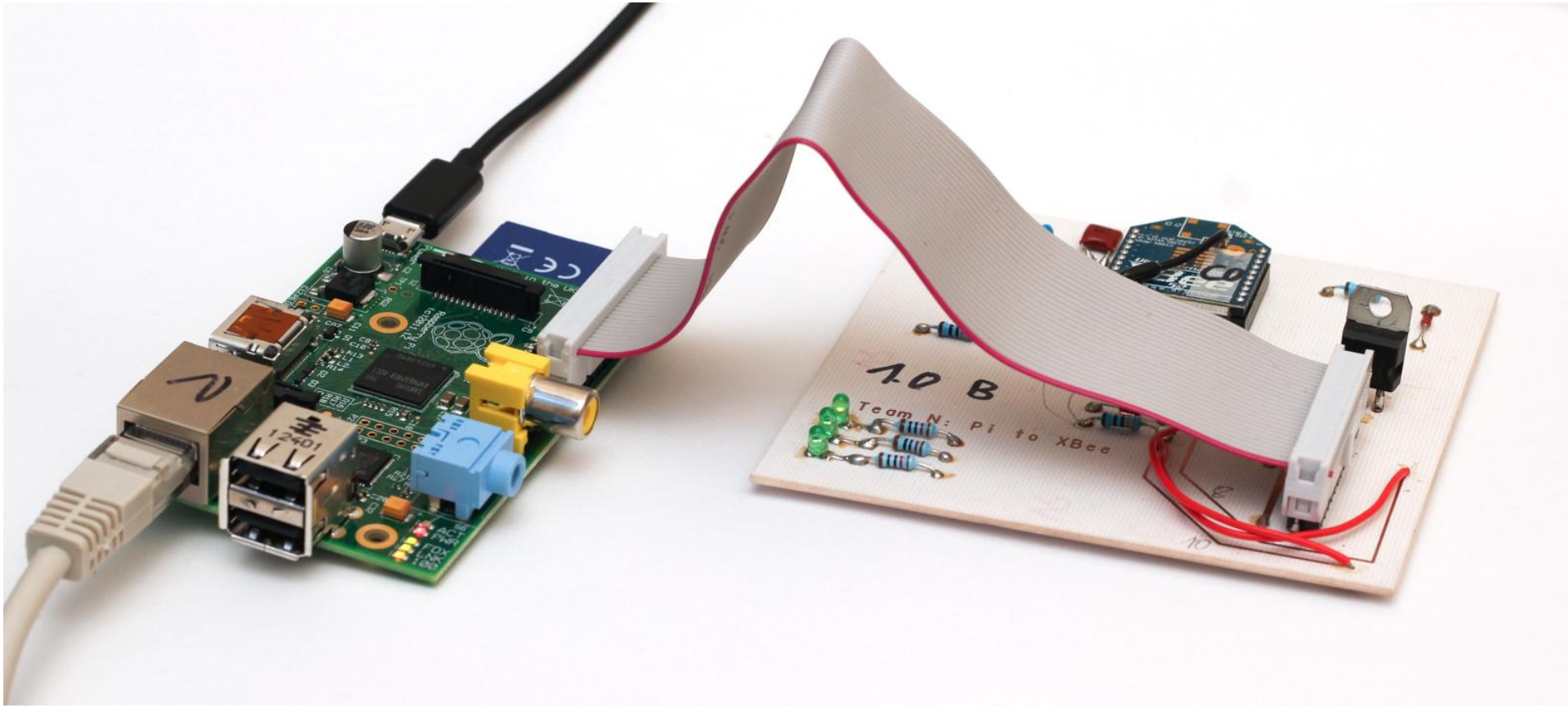
Approach


Scale Unit
Scale Unit
Central
Scale Unit
Scale Unit
External Display Unit

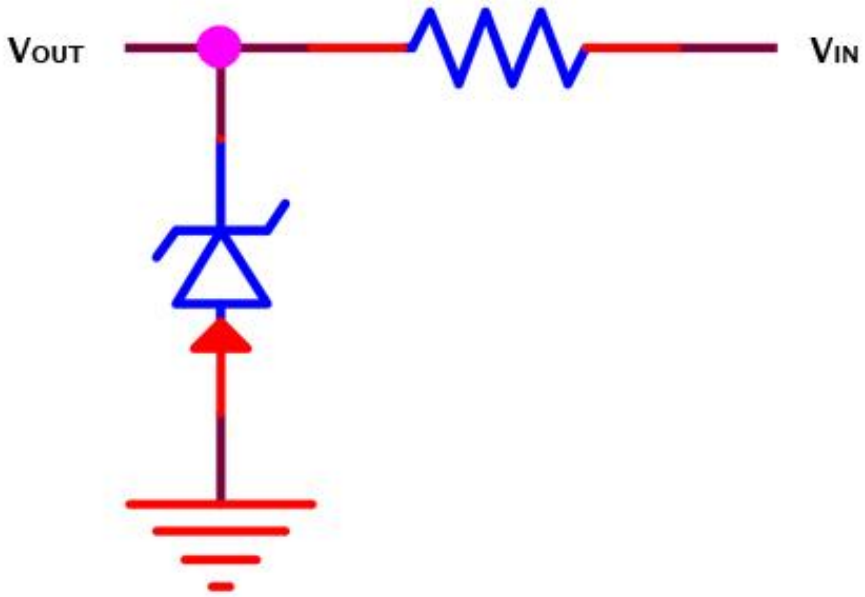
Initial Design



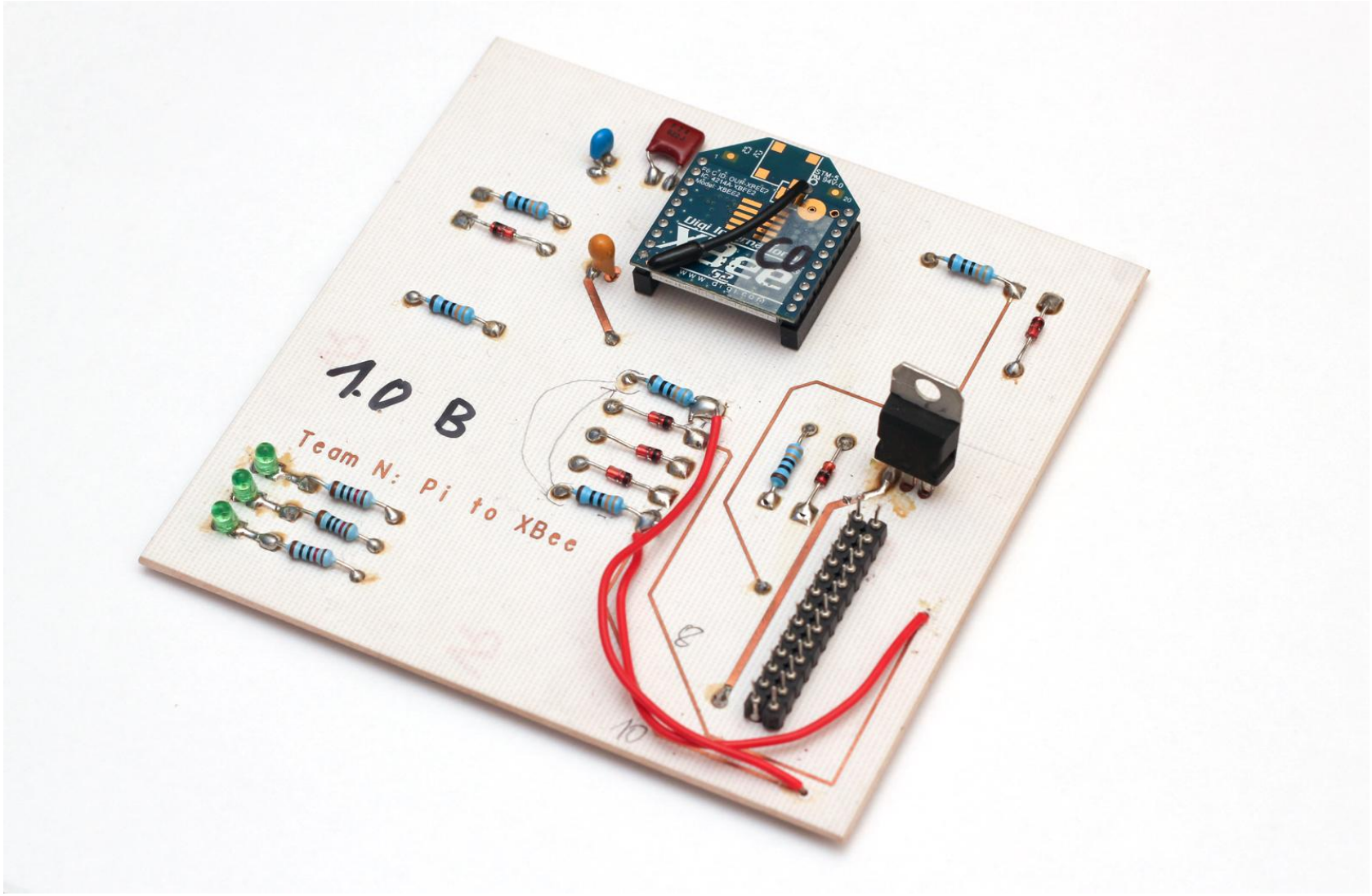
Implementation: Hardware (Central)



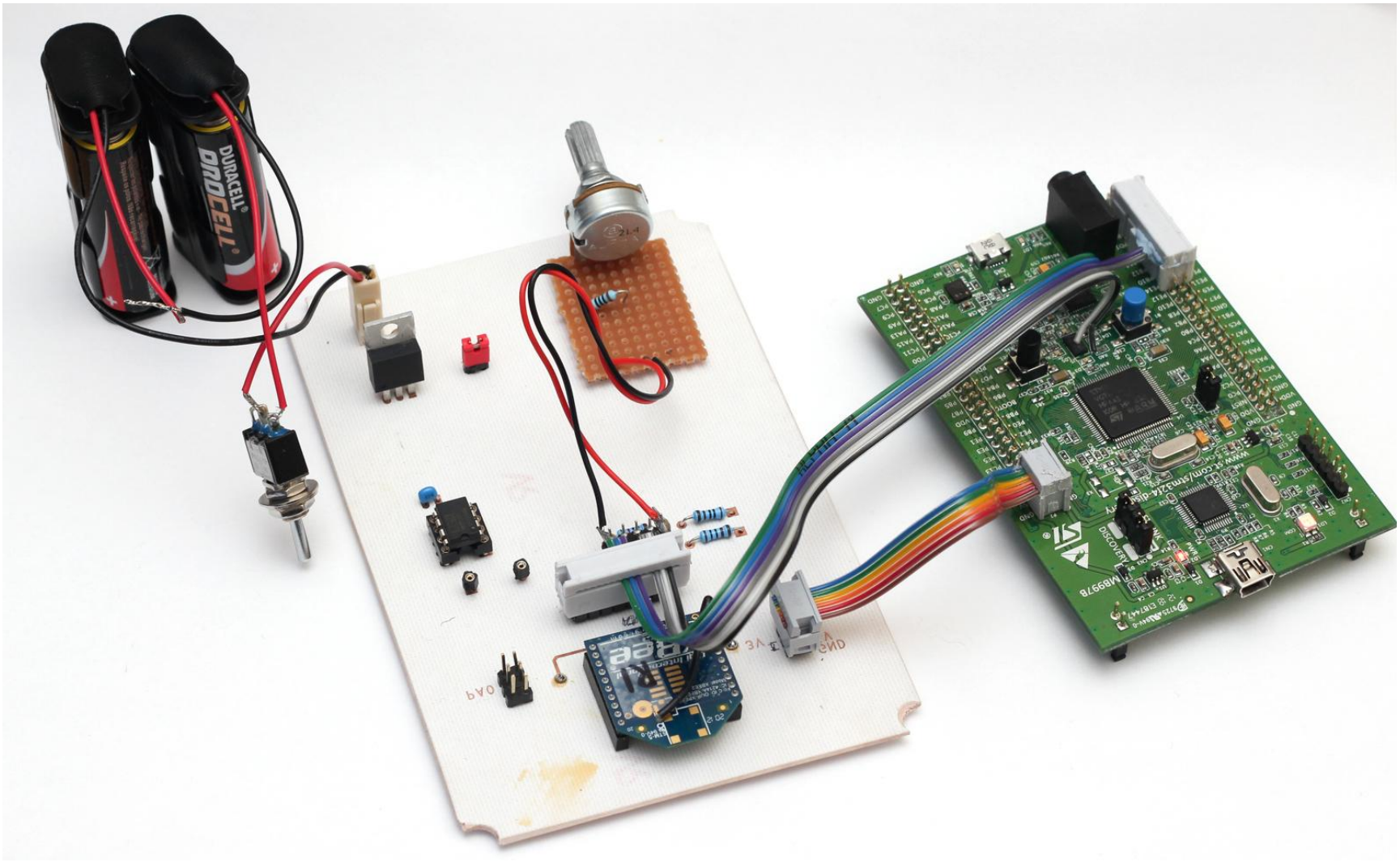
Implementation: Hardware



Implementation: Hardware

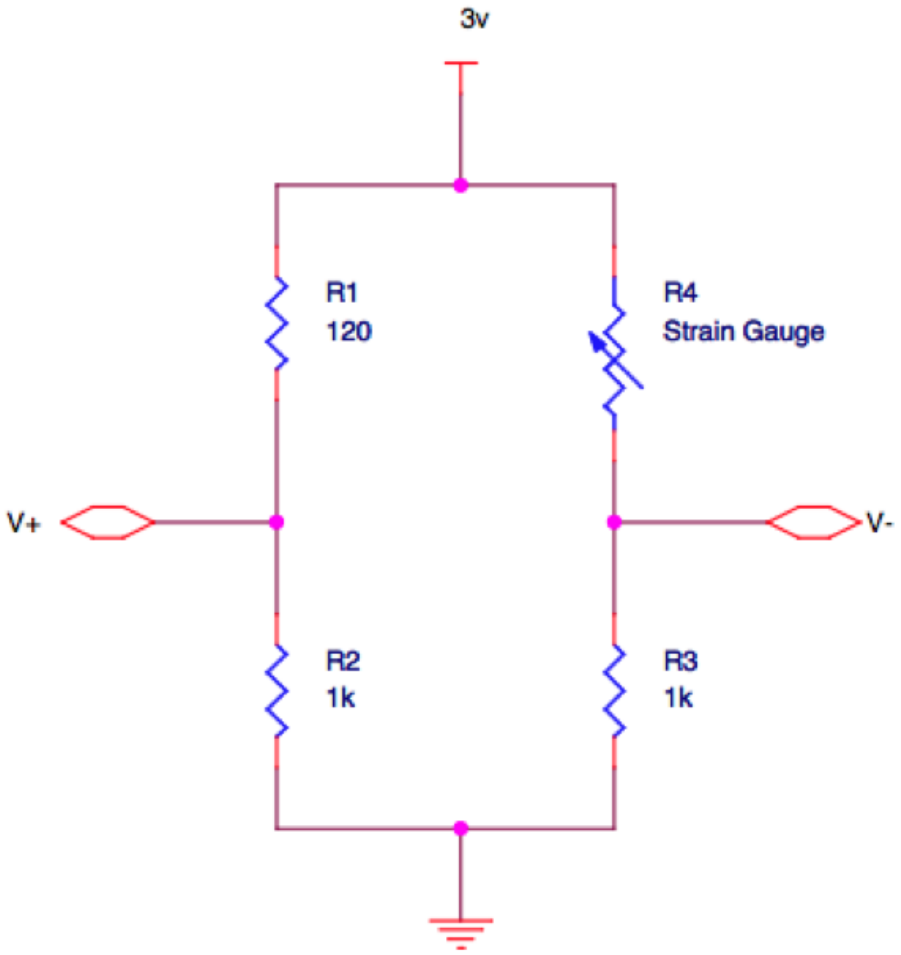


Implementation: Hardware (Scale)

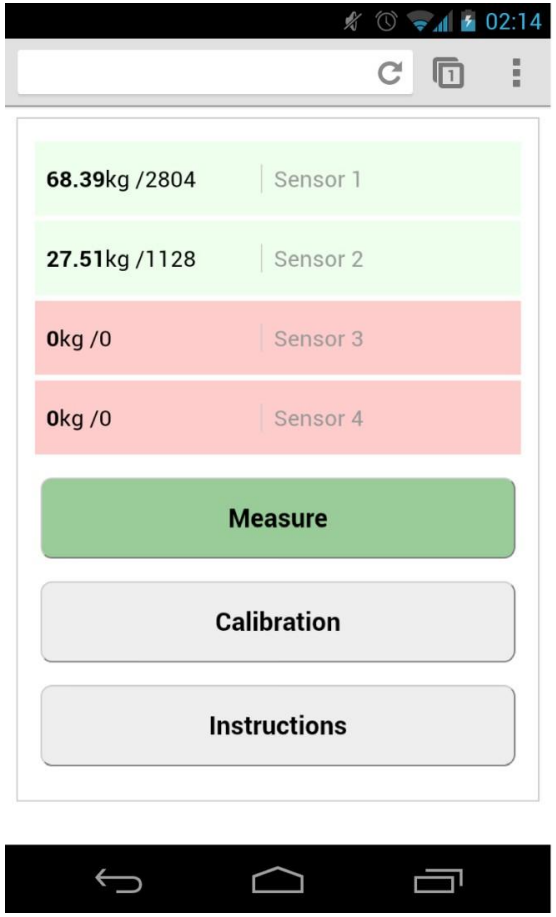


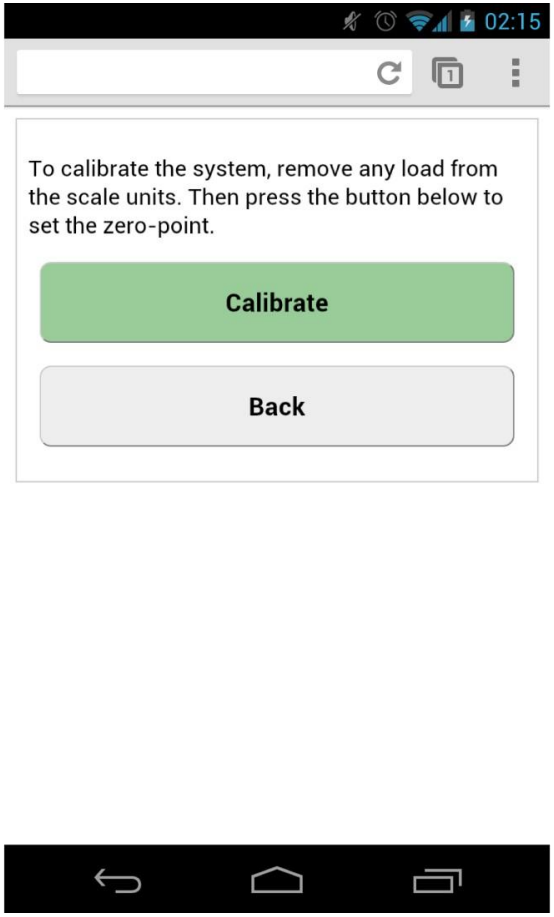
Analogue Design

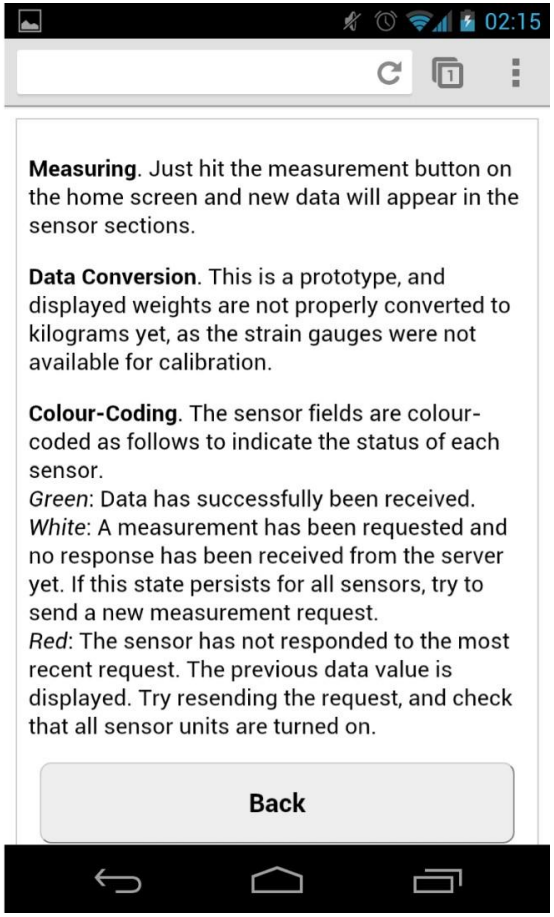
This creates a very small voltage and therefore needs to be amplified



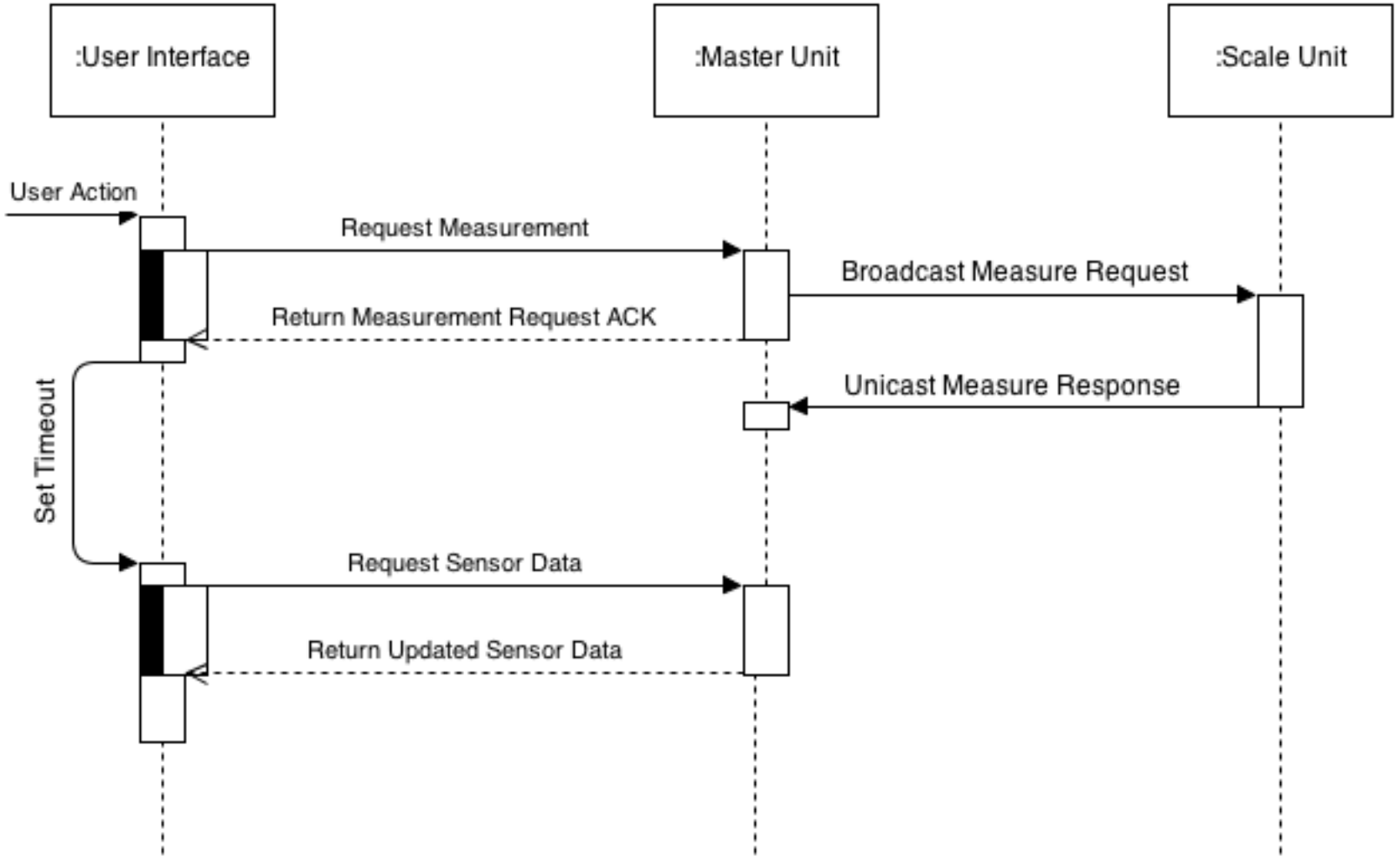
Implementation: Web Application





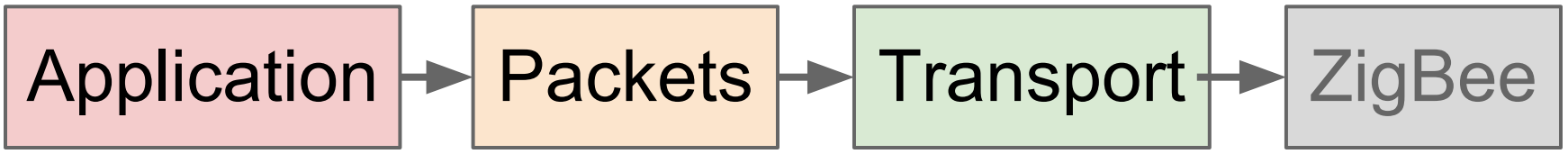


Implementation: Software



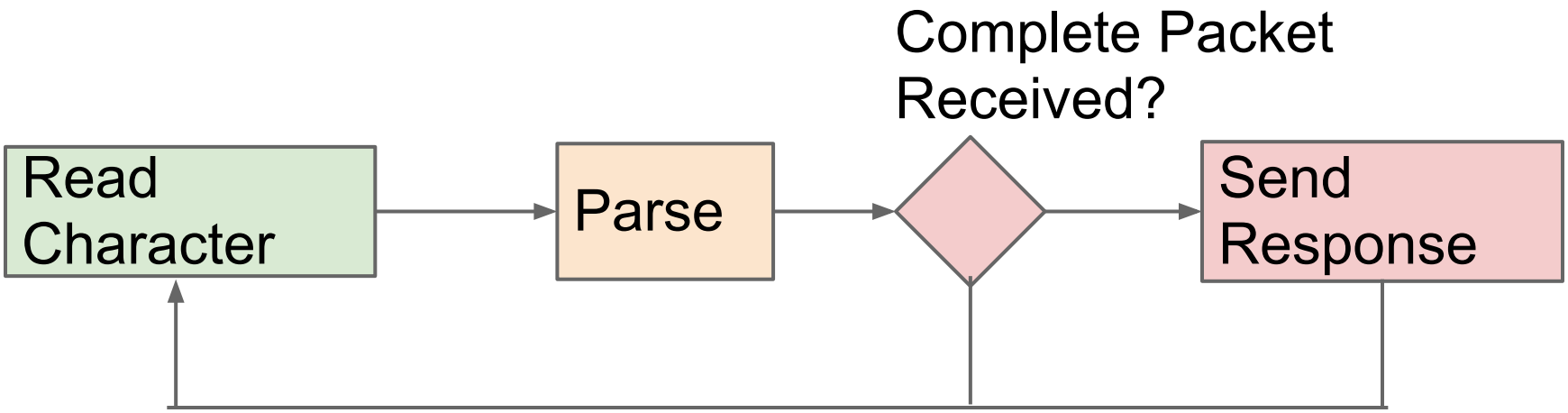
Implementation: Central Unit

- Design for Re-Use
- C Programming Language
- Serial Communication with ZigBee
- Web Server integration



Implementation: Scale Unit

- Replaced Transport implementation
  - UART peripheral
- Continuous ADC conversions (DMA)
- Simple loop - single thread of control



Evaluation & Future Work

Evaluation

- Analogue System
- Communications and Software Systems

Future Work

- Smaller case/waterproofing
- Different Microcontroller
- Minimise power usage through power supply
- ZigBee sleep
- Accuracy Testing
- Additional Scale Units

Demonstration & Questions