



A SHOWCASE OF STUDENT INNOVATION

Beejal Shah

Academic Field Engineer

NI Academic Program

Educators



Researchers



Students



The UK Needs Engineers



Engineering companies are projected to need **182,000 people** with engineering skills each year to 2022



We need to **double the number of graduates and apprentices**

entering the engineering industry



Filling the demand for NEW engineering jobs will generate an **additional £27 billion** per year from 2022 to the UK economy – equivalent to **building 1,800 schools or 110 hospitals**

Supporting Student Innovation

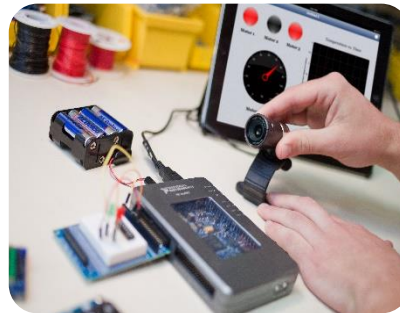
Tools for
Practical
Learning



Project
Sponsorship



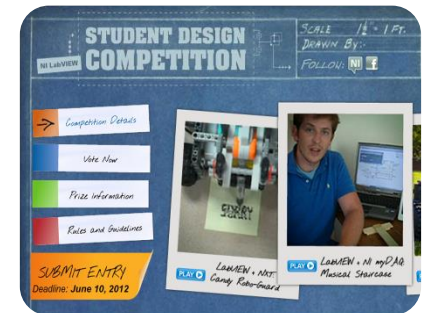
3rd and 4th
Year Projects



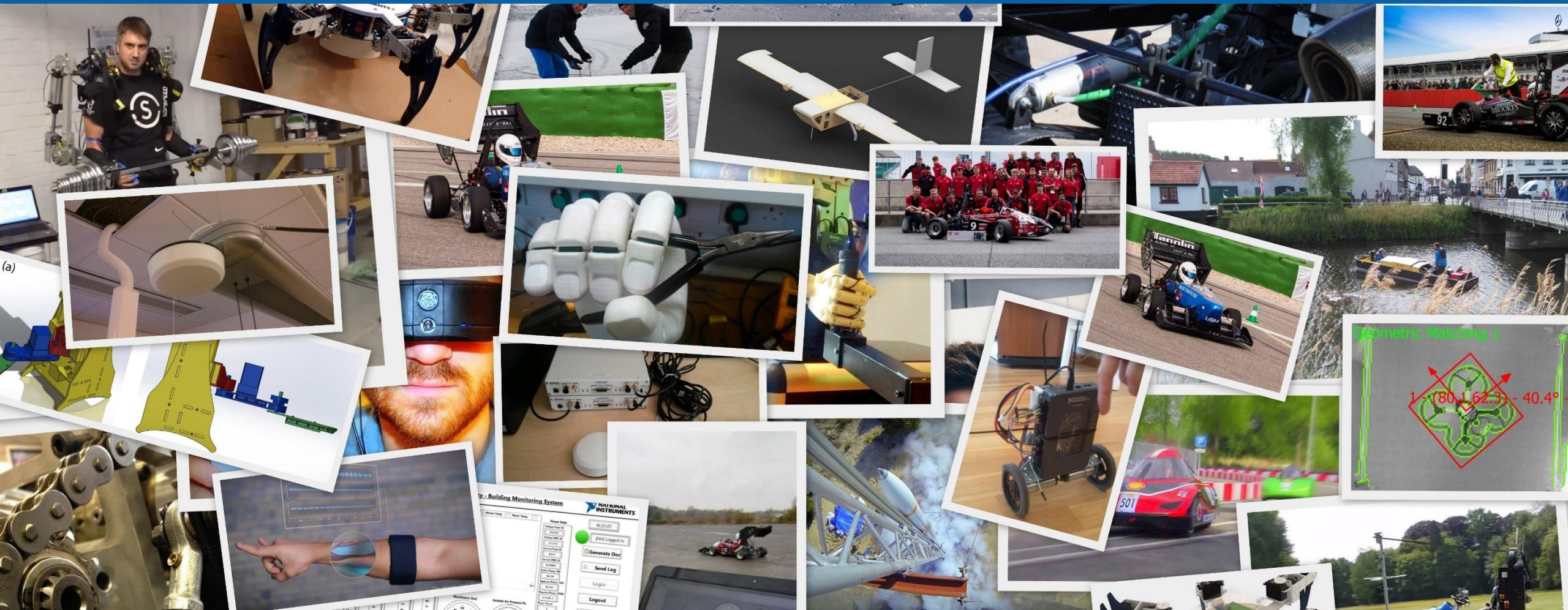
Internships



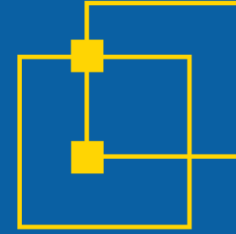
Student
Design
Competition



A diagram showing a large square with a smaller square inside it. The smaller square is positioned in the top-left corner of the larger square. The side length of the smaller square is labeled as \sqrt{a} , and the side length of the larger square is labeled as a . This illustrates that the side length of the smaller square is the square root of the side length of the larger square.



STUDENT DESIGN COMPETITION



The
University
Of
Sheffield.



NTNU

Norwegian University of
Science and Technology

 **TU Delft**



Loughborough
University



University of
Strathclyde
Glasgow



AARHUS UNIVERSITET

UNIVERSITY OF
Southampton

KU LEUVEN



UNIVERSITY OF LEEDS



LIVERPOOL
JOHN MOORES
UNIVERSITY



University of
Reading



DTU Technical
University of
Denmark



HORDALAND
FYLKESKOMMUNE

MANCHESTER
1824

The University of Manchester



Institiúid Teicneolaíochta Chorcaí
Cork Institute of Technology

**Sheffield
Hallam
University**

**SUCCEED
WITH
PLYMOUTH
UNIVERSITY**

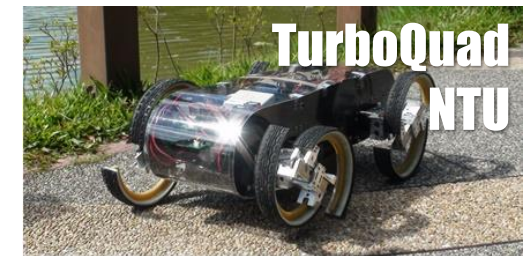
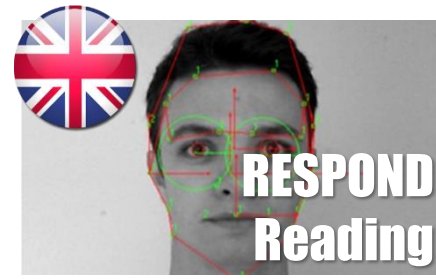
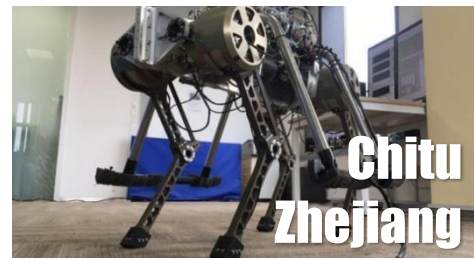
CARDIFF
UNIVERSITY

PRIFYSGOL
CAERDYDD

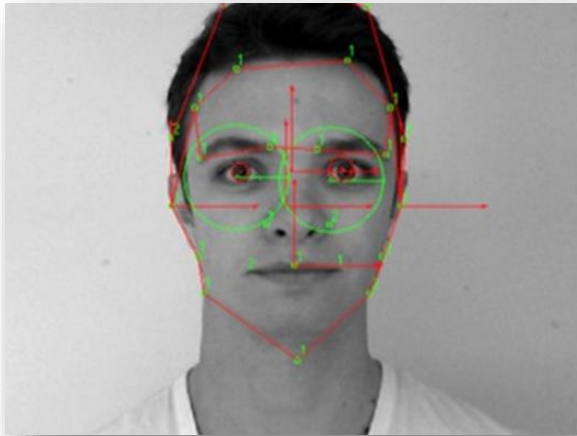
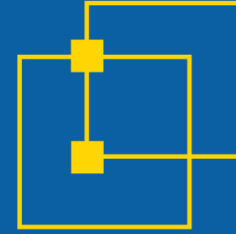
STUDENT DESIGN COMPETITION

TOP 10

Projects Worldwide



STUDENT DESIGN COMPETITION



RESPOND
Callum Bramley
University of Reading

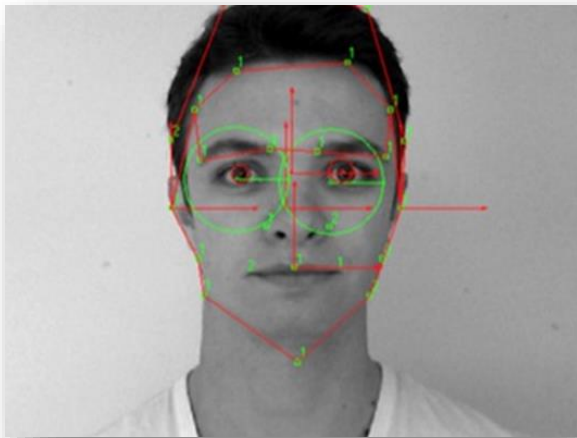
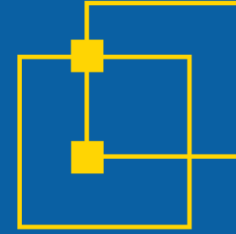


Perfect Pint
James Dickonson
University of Leeds

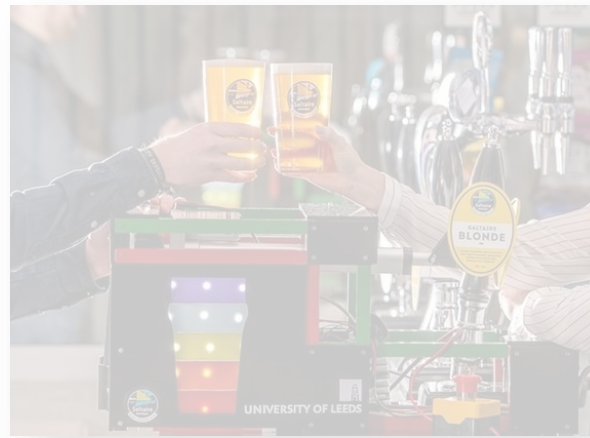


Cardiff Racing
James Willis
Cardiff University

STUDENT DESIGN COMPETITION



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Callum Bramley
University of Reading



Perfect Pint
James Dickonson
University of Leeds



Cardiff Racing
James Willis
Cardiff University

RespQnd

The recognition system
for people and objects
in dementia care

An overview of RESPOND

Aimed
primarily at
dementia
patients

A prototype
application built
in LabVIEW that
can recognise
people and
objects.

Currently built
as a laptop
program, but is
being written for
the app market



36 million

patients globally in 2012

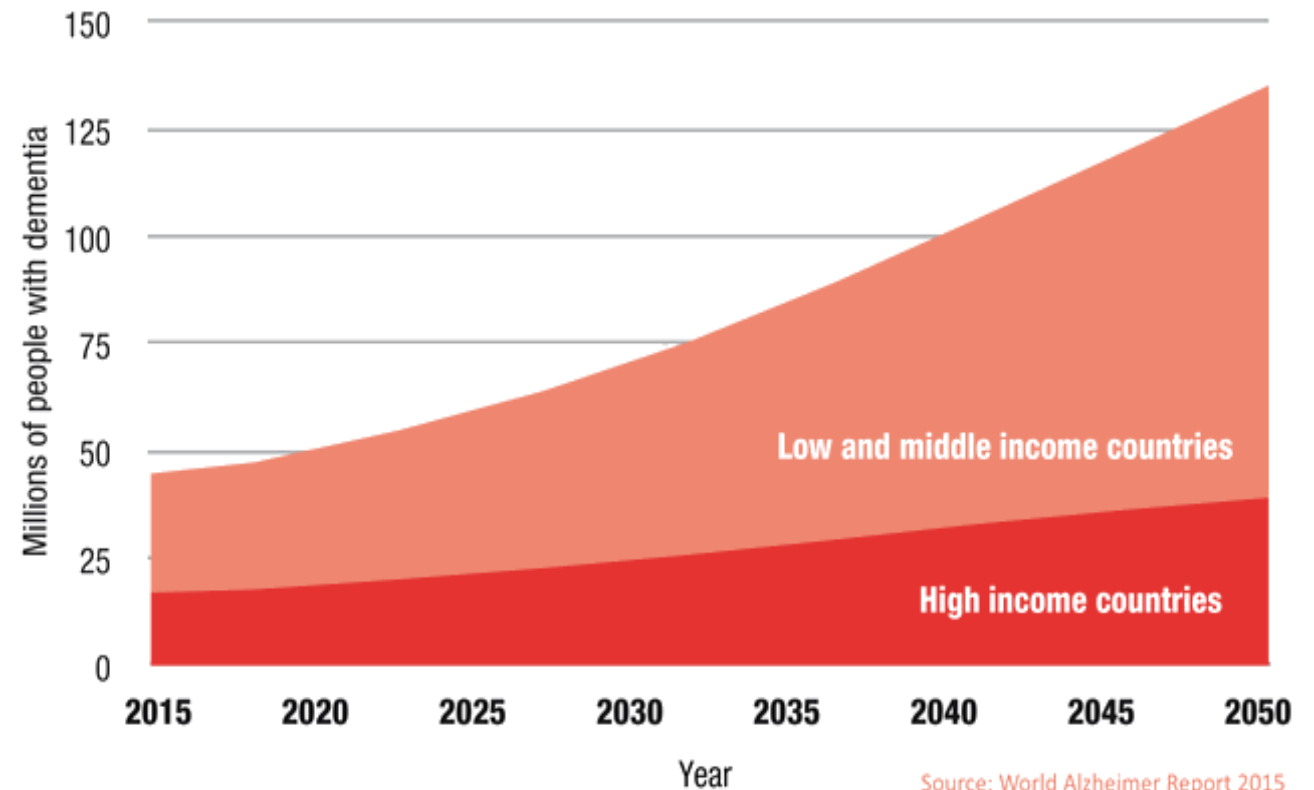
70 million

patients globally by 2030

\$604 billion

per year spent on treatment
globally

The number of dementia patients is rising globally



Source: World Alzheimer Report 2015

Symptoms of dementia

Dementia causes a person to lose their cognitive abilities over time, leaving them **unable to recognise their own family members.**

This can also lead to the patient being unable to recognise objects, and confusing the words for them.

Their behaviour and personality can begin to change, leaving them in some cases **alienated.**

These symptoms will leave the patient feeling **dependent and unconfident**

The funding to help these patients is being cut



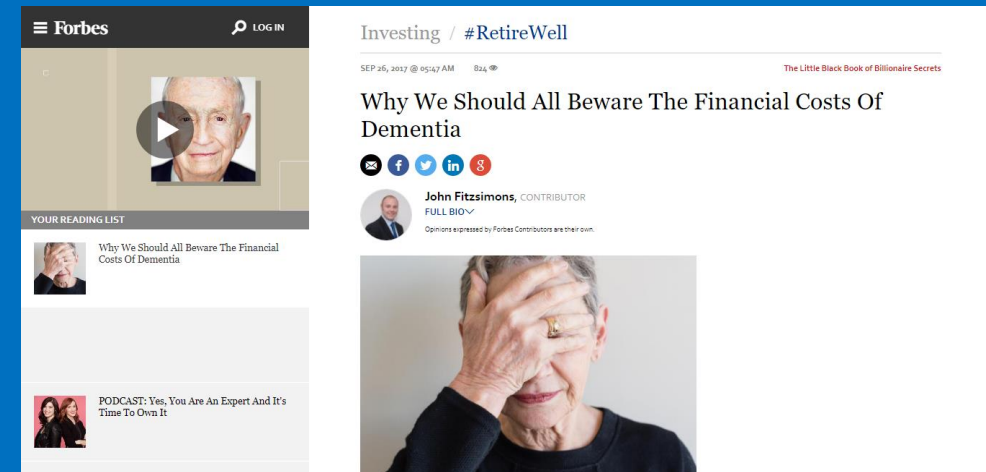
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The cost to the UK alone is now £26 Billion to care for dementia patients



*The development of accessible, age-appropriate health and social care services is an **urgent priority**. These should provide continuing care for those with dementia...*

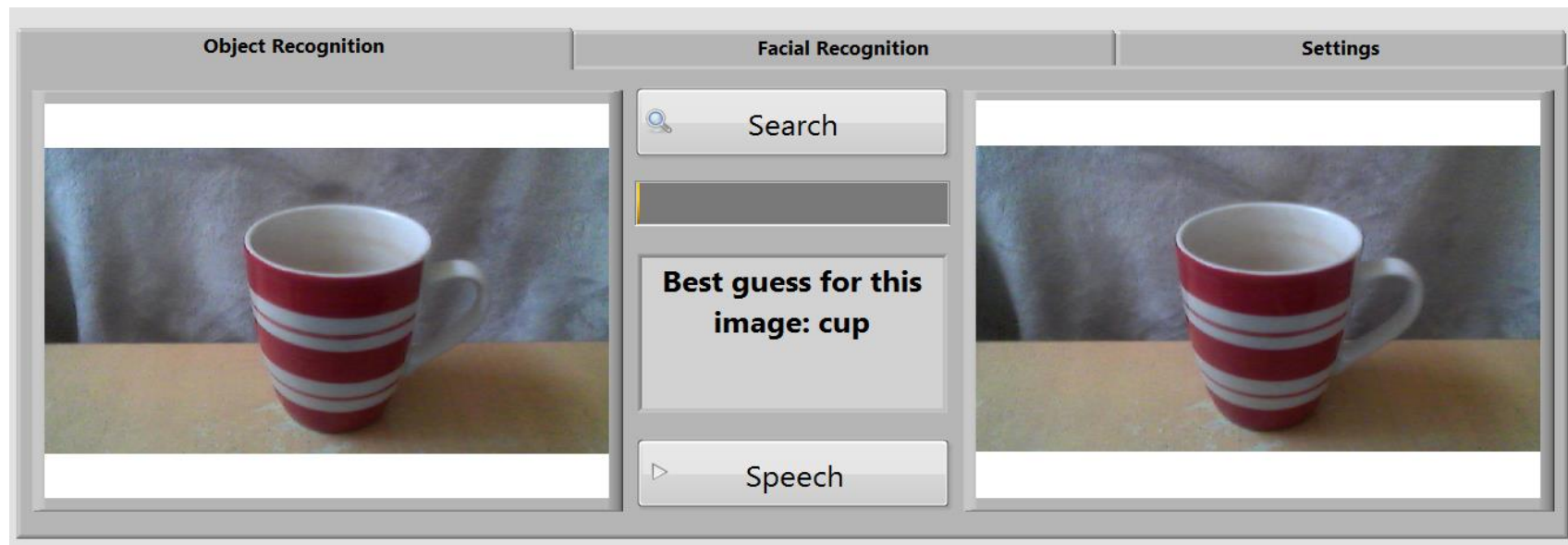
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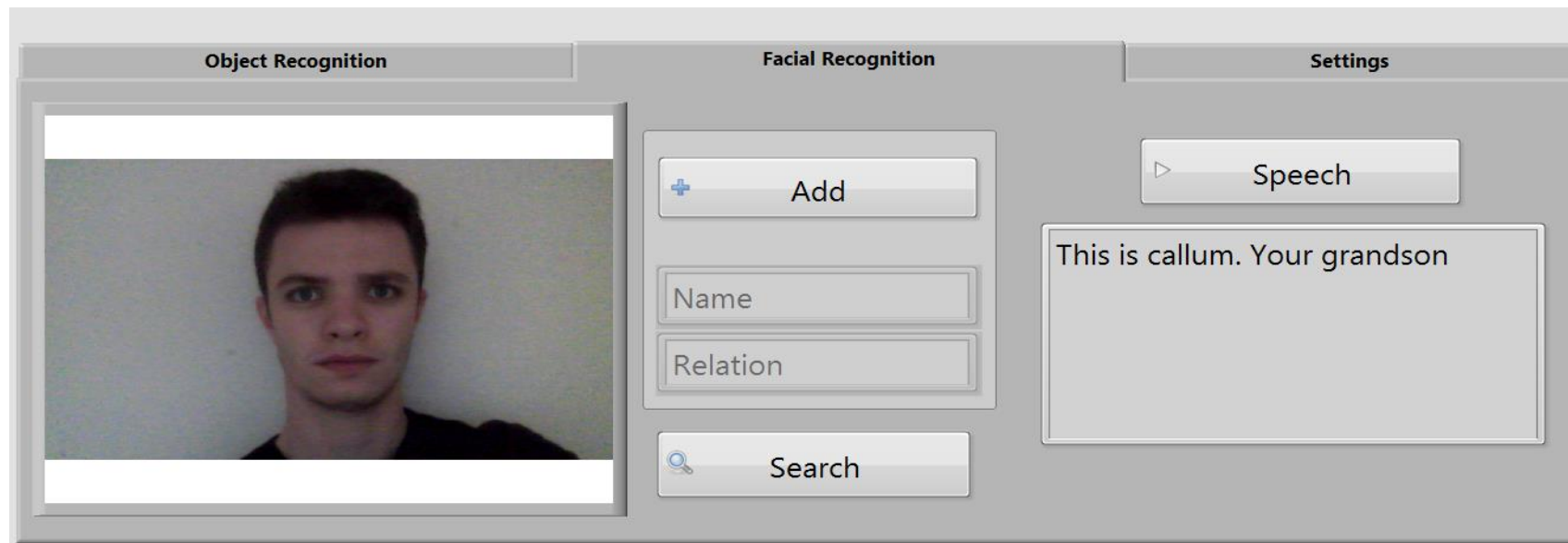
BECAUSE OF THE CUTS TO MENTAL HEALTH CARE IN THE
NHS, PATIENTS ARE BEING DISCHARGED FROM HOSPITALS
FASTER....

WE NEED TO FIND NEW WAYS TO TREAT THESE PATIENTS
AT HOME

The prototype app can recognise objects...



As well as faces, and being able to 'speak' the word back to the user



The benefits of RESPOND

Decreased
dependence on
others for simple
recognition

Increase in
independence

Aids with
language
rehabilitation

Integrates well with
current treatment
methods, nurses no longer
need to focus on simple
tasks

Enjoyable to use
and helps the
elderly become
familiar
technology

What's next for RESPOND?

The next stage is to develop the program into Android and IOS apps, with a **user interface designed specifically for the elderly.**

By integrating Amazon web services into the app, the recognition of people and objects will be **faster** and more **accurate**



Possible competitors

Samsung released the Memory Recaller app in 2015, however this only included facial recognition



Several object recognition apps are starting to become available, however, they are few and far between, and have no targeted aim.



An app that uses both of these technologies has not been developed with the elderly generation in mind.

Other potential use cases

Other illnesses and injuries: Such as **strokes**, **prosopagnosia** (face blindness), **head trauma**, **Huntingtons**, **Parkinsons** etc.

Smart doorbells - enabling the user to be informed who is at the door and whether they are known to them **before they answer.**

Global Engineering Impact Awards

In the summer of 2017 the RESPOND prototype was voted third at the **Global Engineering Impact Awards**

Which allowed the design to be exhibited at NIWeek in Texas.

The design will also be exhibited at the European awards, as well as NIDays



About the creator

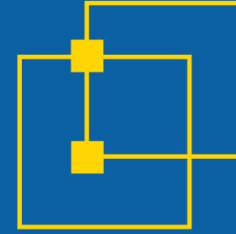
Callum graduated the University of Reading in 2017 with a 1st class degree in robotics

Part of the **Huawei Seeds For The Future** campaign as well as the **Engineering Leadership** program provided by National Instruments



For more information contact:
bramleycallum@gmail.com

STUDENT DESIGN COMPETITION



RESPOND
Callum Bramley
University of Reading



Perfect Pint
James Dickonson
University of Leeds

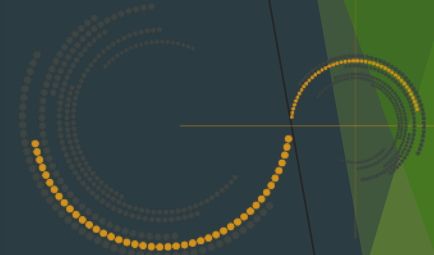


Cardiff Racing
James Willis
Cardiff University

The Perfect Pint Project



UNIVERSITY OF LEEDS



QUALITY BEARINGS ONLINE

Keeping the world turning



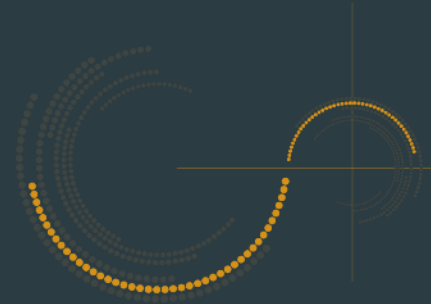
Jim Dickinson, Joey Subert, James Ash, Chris Hayley, Amirah Nabilah

Introduction

- 5 University of Leeds students
- Idea by Quality Bearings Online
- Sponsored by Saltaire Brewery
- The task: Build a robot to pour the perfect pint of ale
- Compete against a human to decide a victor



UNIVERSITY OF LEEDS



QUALITY BEARINGS ONLINE

Keeping the world turning



Project Process and Disciplines

- ▶ Wide variety of project tasks:

- ▶ In depth research

- ▶ Beer robots

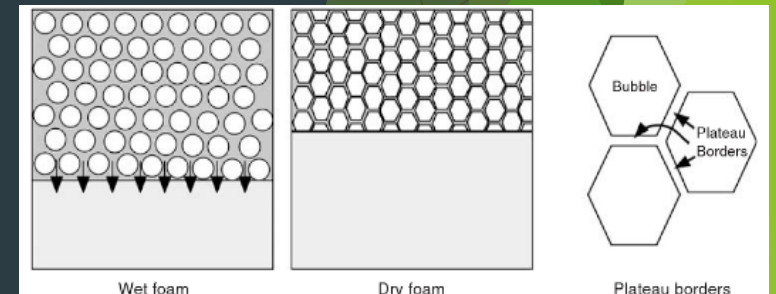
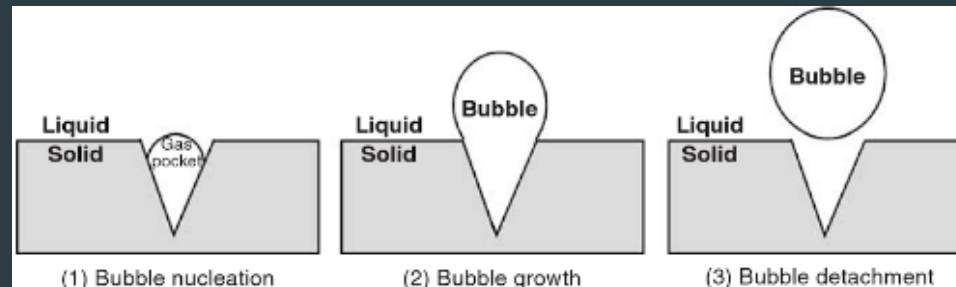
- ▶ Bubble science

- ▶ Dynamic testing



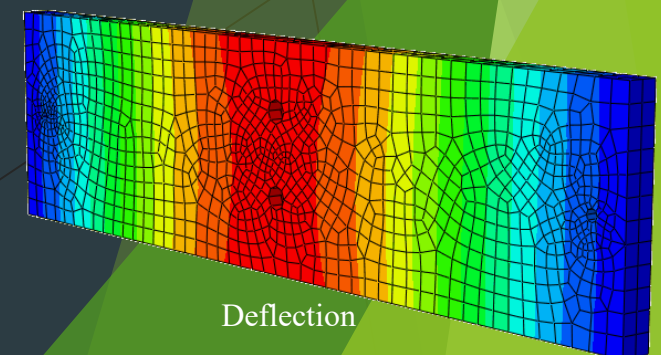
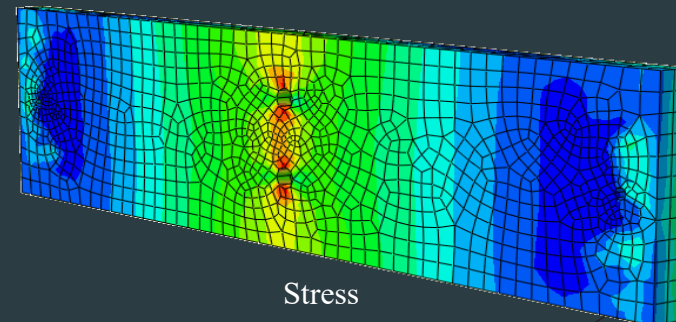
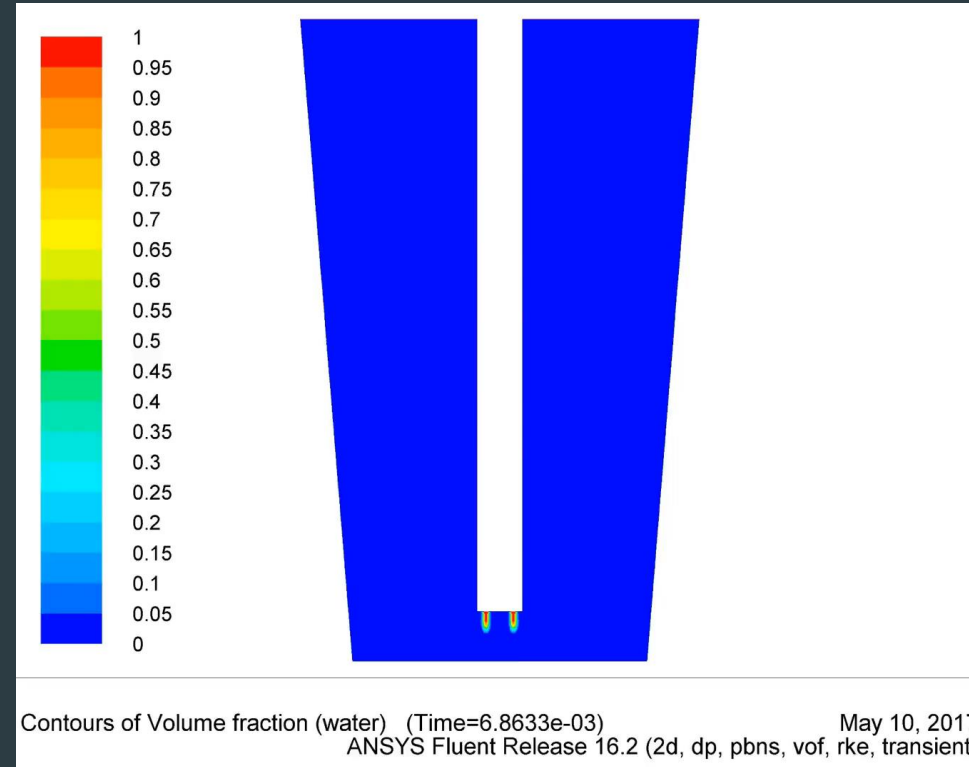
FORMATION: $BR = \left| \frac{3R_m\gamma}{2\rho g} \right|^{\frac{1}{3}}$

RETENTION: $Q = \frac{2\rho g q \delta}{3\eta}$

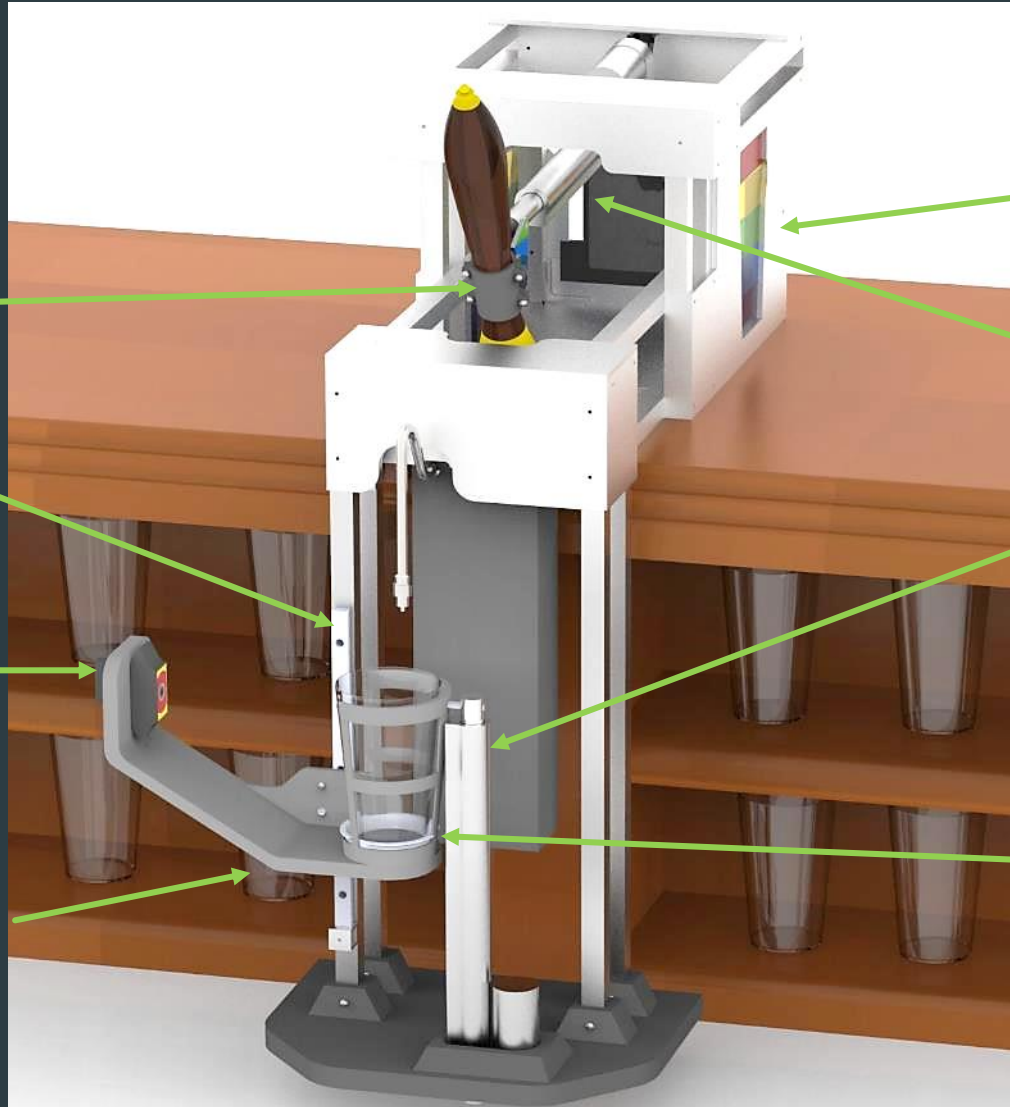


Project Process and Disciplines

- ▶ Wide variety of project tasks:
 - ▶ Motion capture
 - ▶ Kinematic and dynamic modelling
 - ▶ Computational Fluid Dynamics (CFD)
 - ▶ Mechanical Design
 - ▶ Finite Element Analysis (FEA)



Final Design



Handle grip

Linear
Bearing

Camera

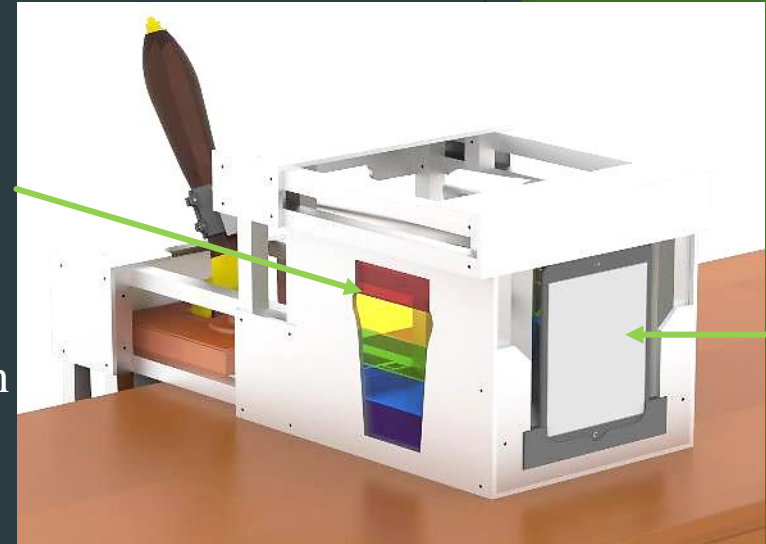
Glass Holder

LEDs

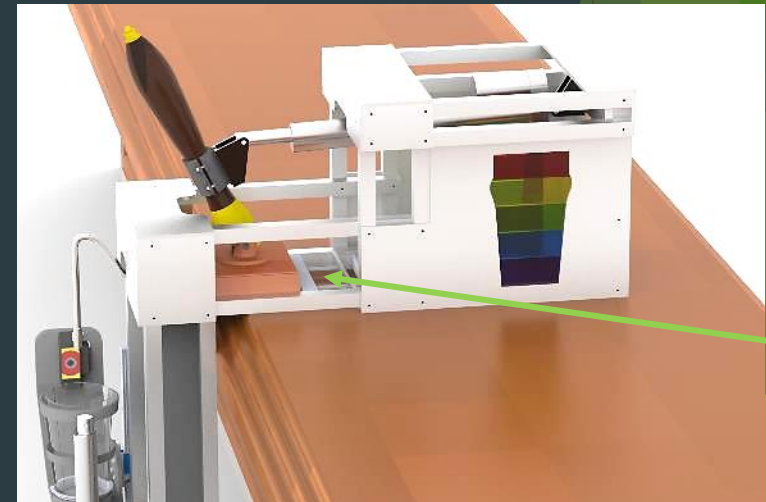
Handle
Actuation

Glass
Actuation

Load
Cell



Tablet
Interface

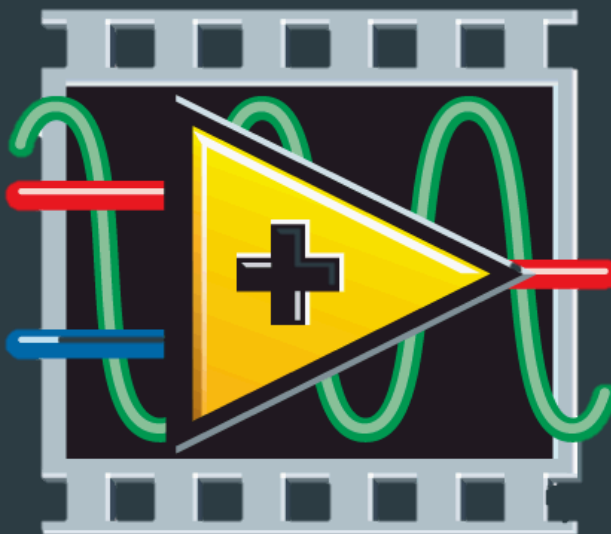


Gripping
Module

National Instruments

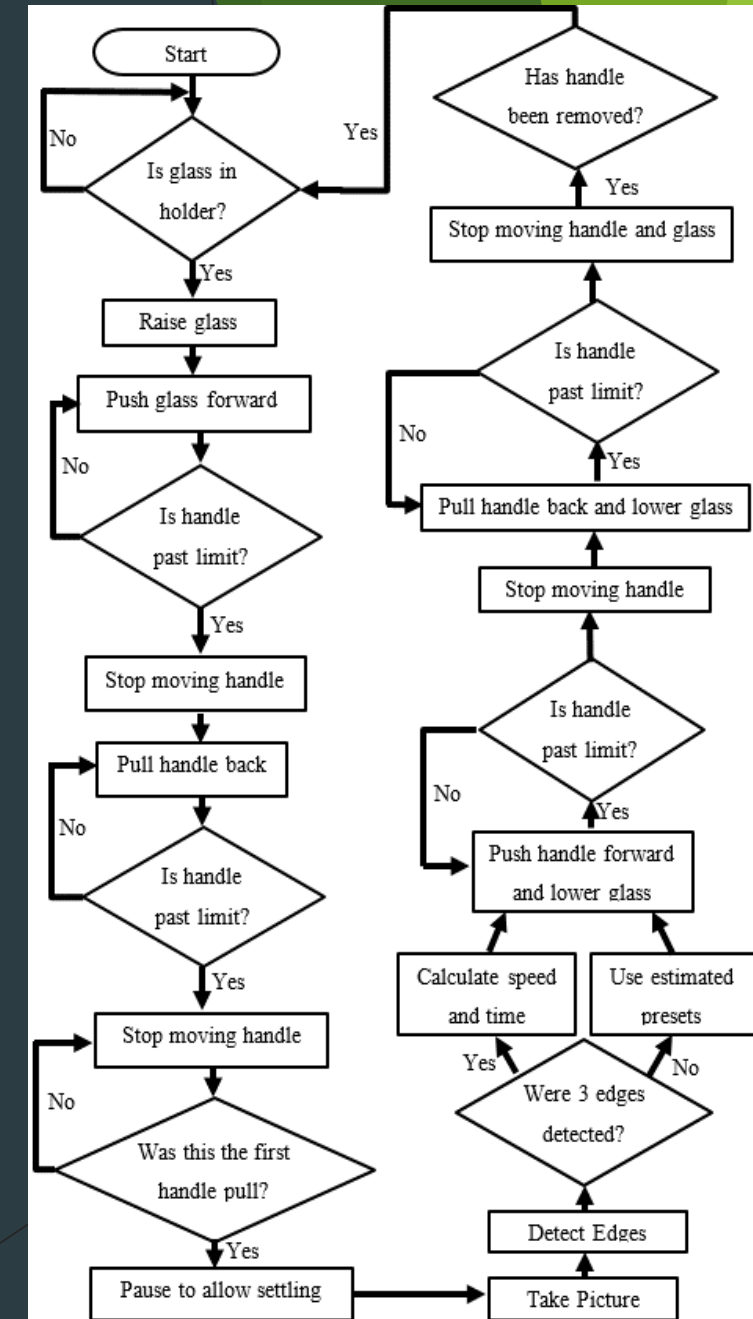
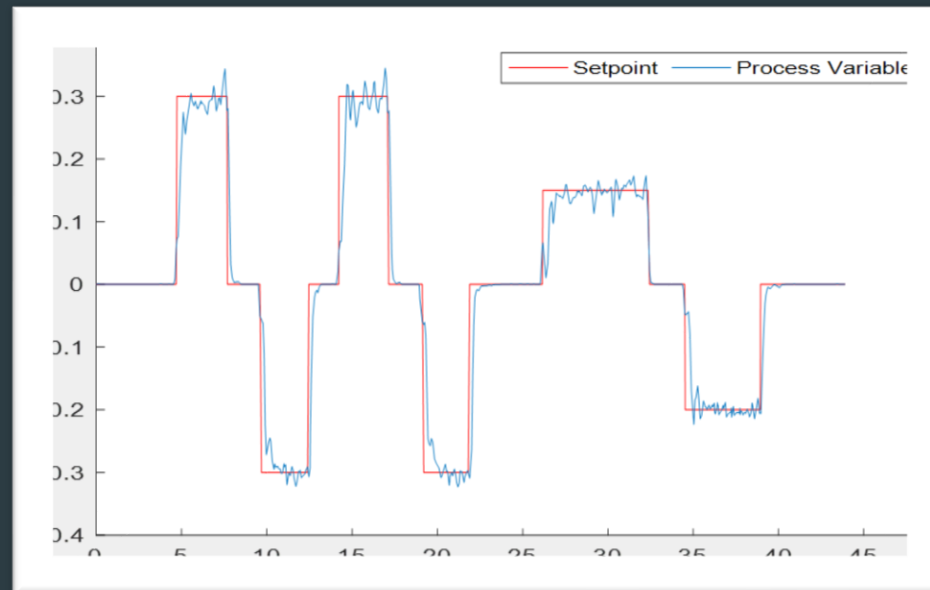
- ▶ 3 Processing platforms:

- ▶ FPGA
- ▶ Real-Time
- ▶ Laptop PC



Control

- “Proportional, integral” (PI) motor control
- Closed loop improves accuracy
- Filtering techniques reduce noise



User Interfaces

Currently pouring your
pint. Please wait
patiently

Main Settings

☒ Glass In Holder ☒ Pouring

Beers Poured Pour Time

Head Thickness mm Beer Mass kg

Trend of Head Thickness

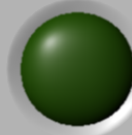


UNIVERSITY OF LEEDS



Currently pouring your
pint. Please wait
patiently

Glass In Holder

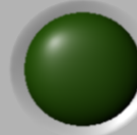


Beers Poured

Head Thickness

 mm

Pouring



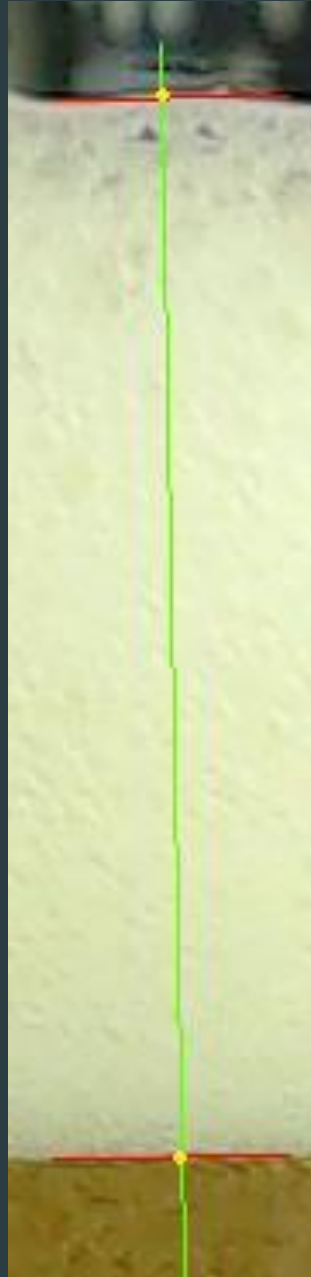
Pour Time

Beer Mass

 kg

Machine Vision

- ▶ Takes a still image $\frac{3}{4}$ way through pour
- ▶ Calculates remaining volume
- ▶ Tops up pint
- ▶ Improves accuracy



Competition

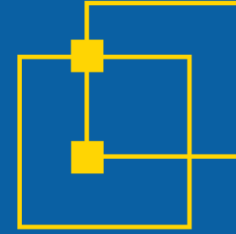
- And the winner was...

THE
ROBOAT

Thank you



STUDENT DESIGN COMPETITION



RESPOND
Callum Bramley
University of Reading



Perfect Pint
James Dickonson
University of Leeds



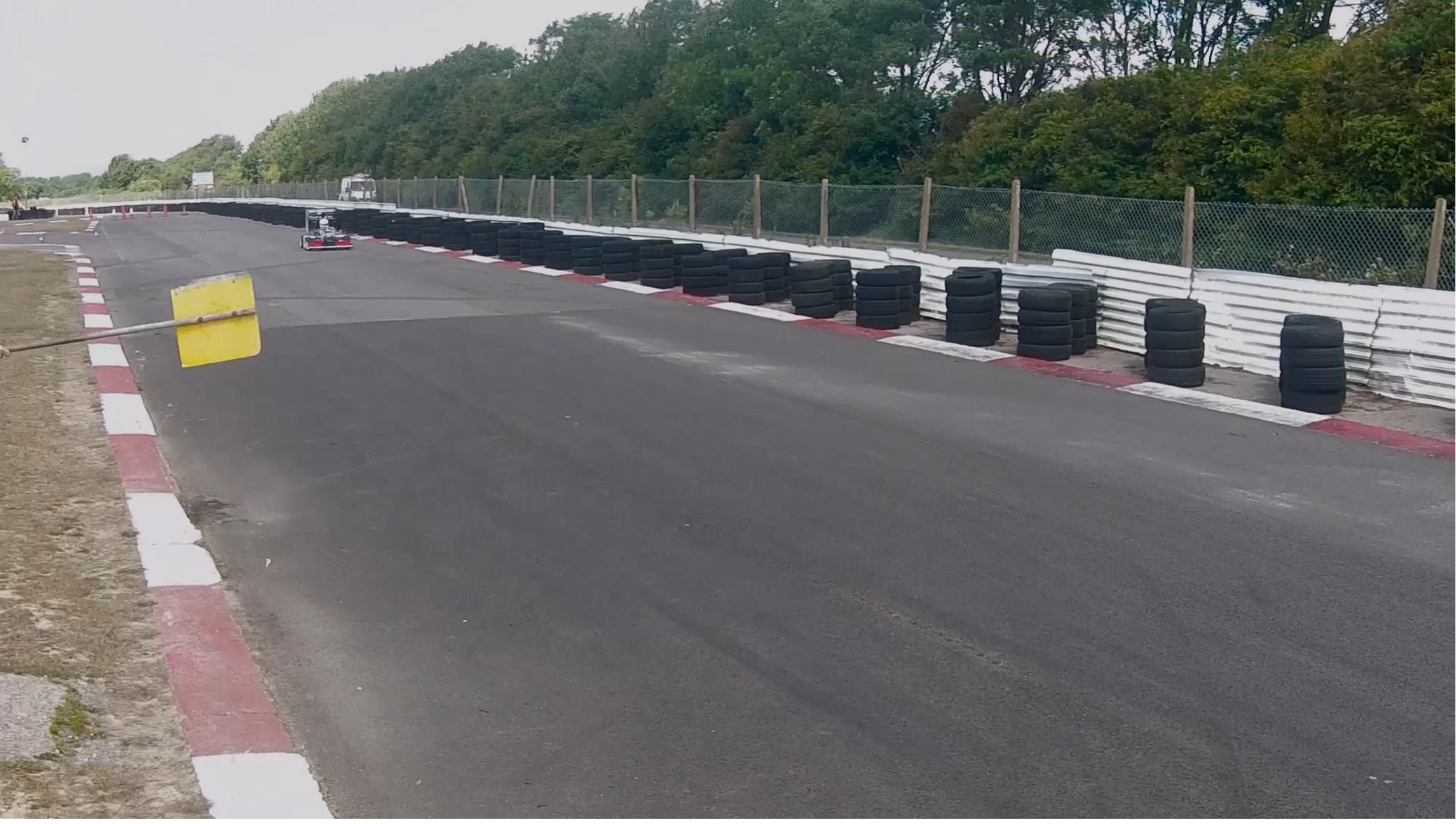
Cardiff Racing
James Willis
Cardiff University

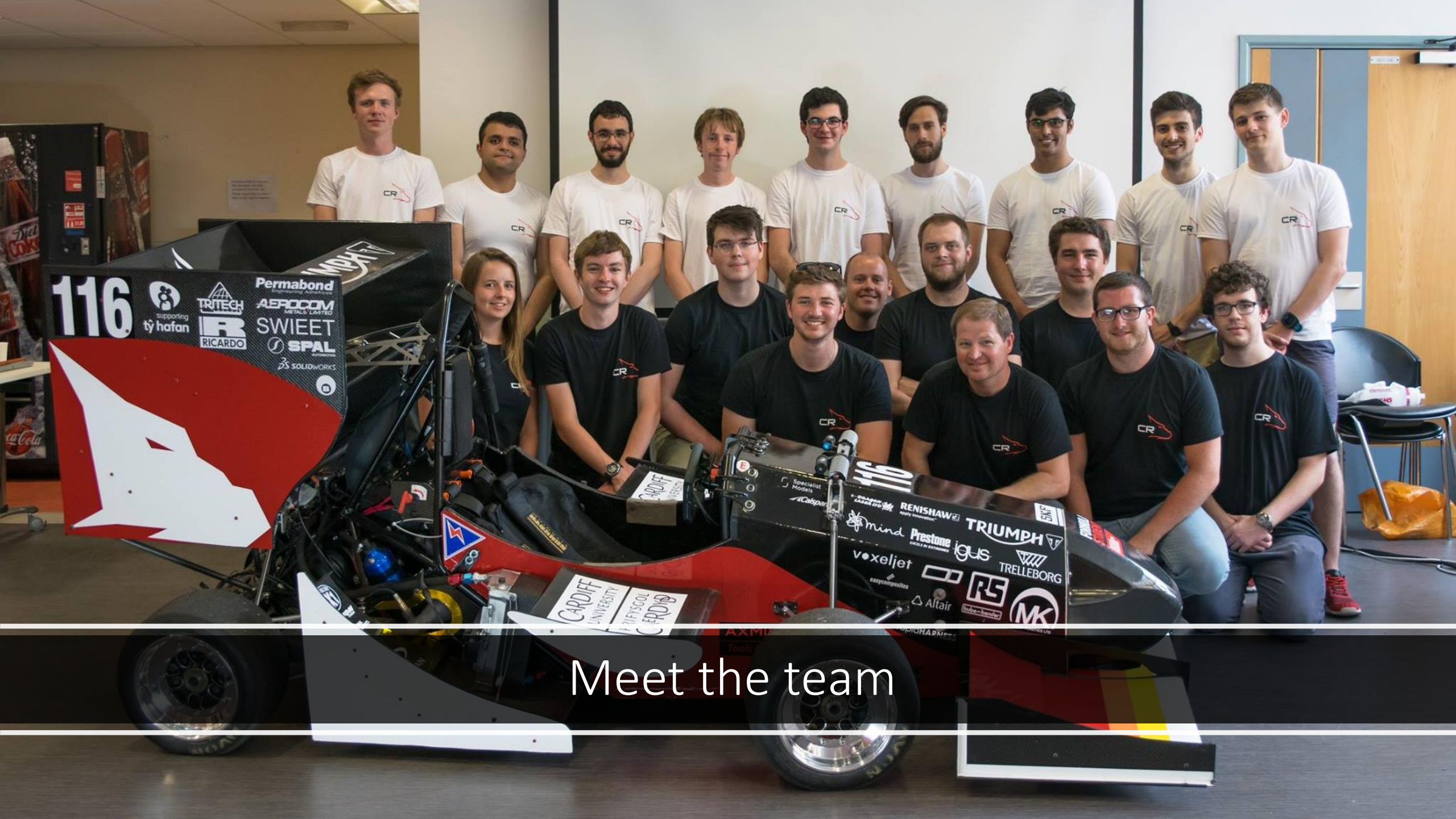


C R 1









Meet the team

FORMULA STUDENT

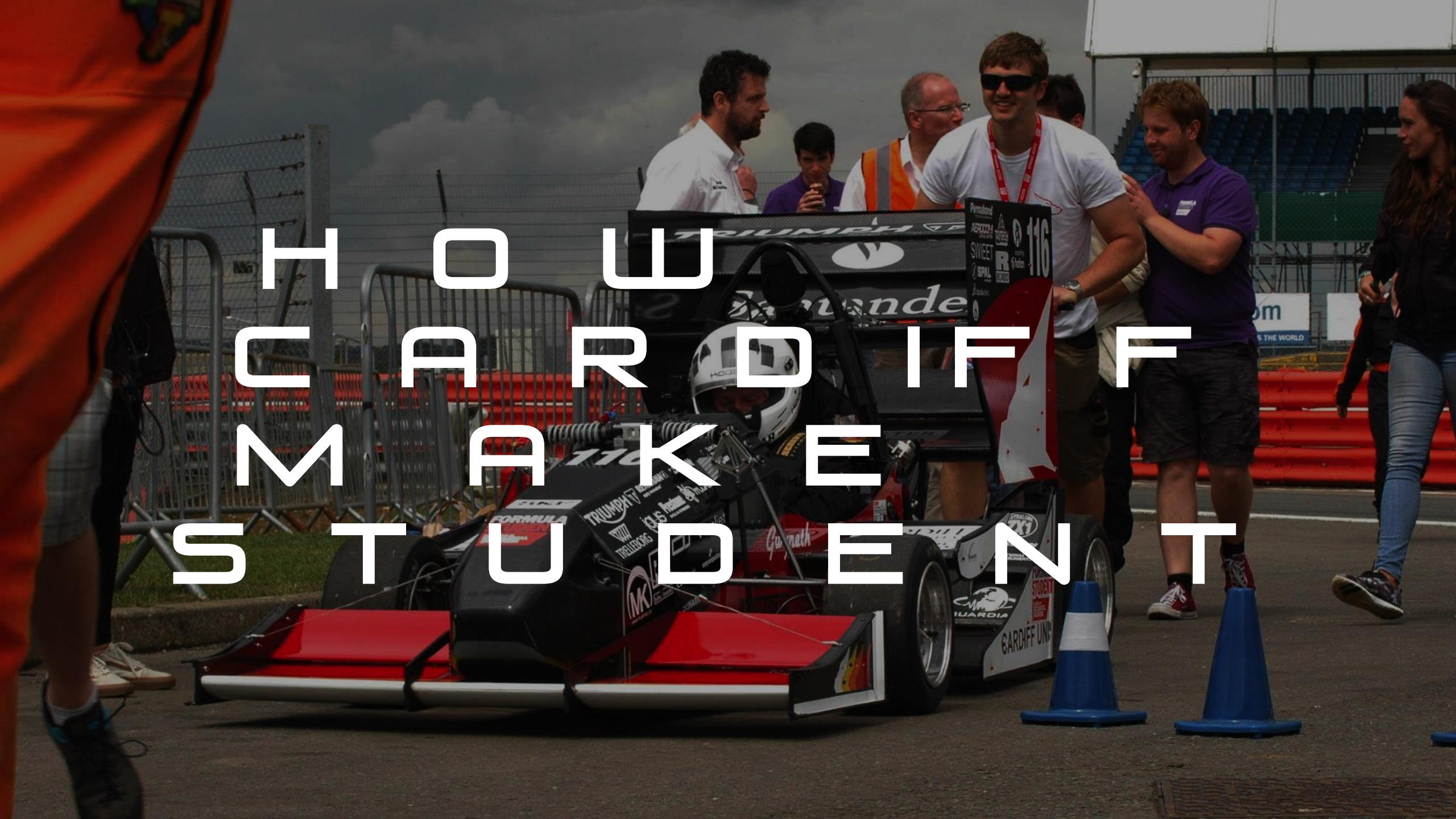
Institution of
**MECHANICAL
ENGINEERS**

THE CHALLENGE

- To produce a prototype for a single-seat race car for autocross or sprint racing, and present it to a hypothetical manufacturing firm.
- Each team goes through a rigorous testing process, made up of:
 - Static events
 - Dynamic events



HOW CARDIFF MAKES STUDENT



D E V E L O P M E



2 -

O U R

- NI technology, sponsorship and support has fuelled our rapid ascent through the rankings
- Several in-vehicle innovations to improved our performance and driver experience



INNOVATION CLUTCH



- Uses a position controlled Servo motor to grant the driver full control of the clutch
- Ensures the fastest possible downshifting and launch acceleration
- Control system based around the myRIO and Hitec HS-1100WP servo

INNOVATION DRIVER



- Full colour driver display
- Wireless telemetry and datalogging using wifi
- sbRIO platform, along side a Amulet Technologies Display

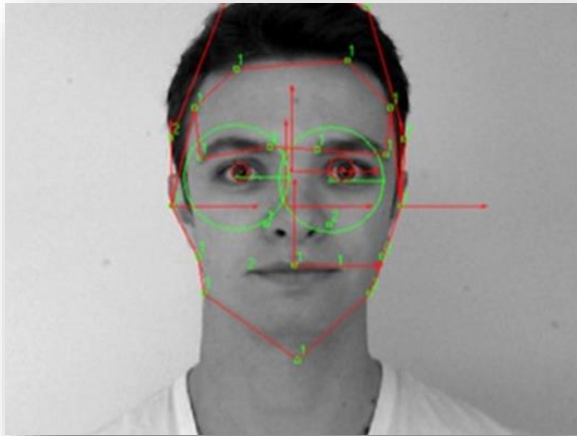
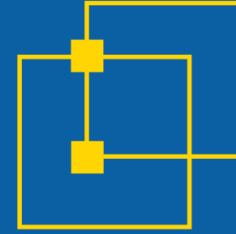


CARDIFF RACING

A
T H A N K



STUDENT DESIGN COMPETITION



RESPOND
Callum Bramley
University of Reading

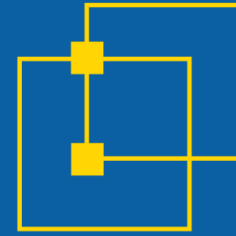


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→→→ STUDENT DESIGN COMPETITION



Competition Prizes

Each Entry: £30 Amazon Gift Voucher

UK Grand Prize: £500 Voucher and Industry Award Recognition

Global Grand Prize: \$2000 and a trip to NIWeek in Austin, Texas

Now Accepting Admissions for 2017

uk.ni.com/studentdesign