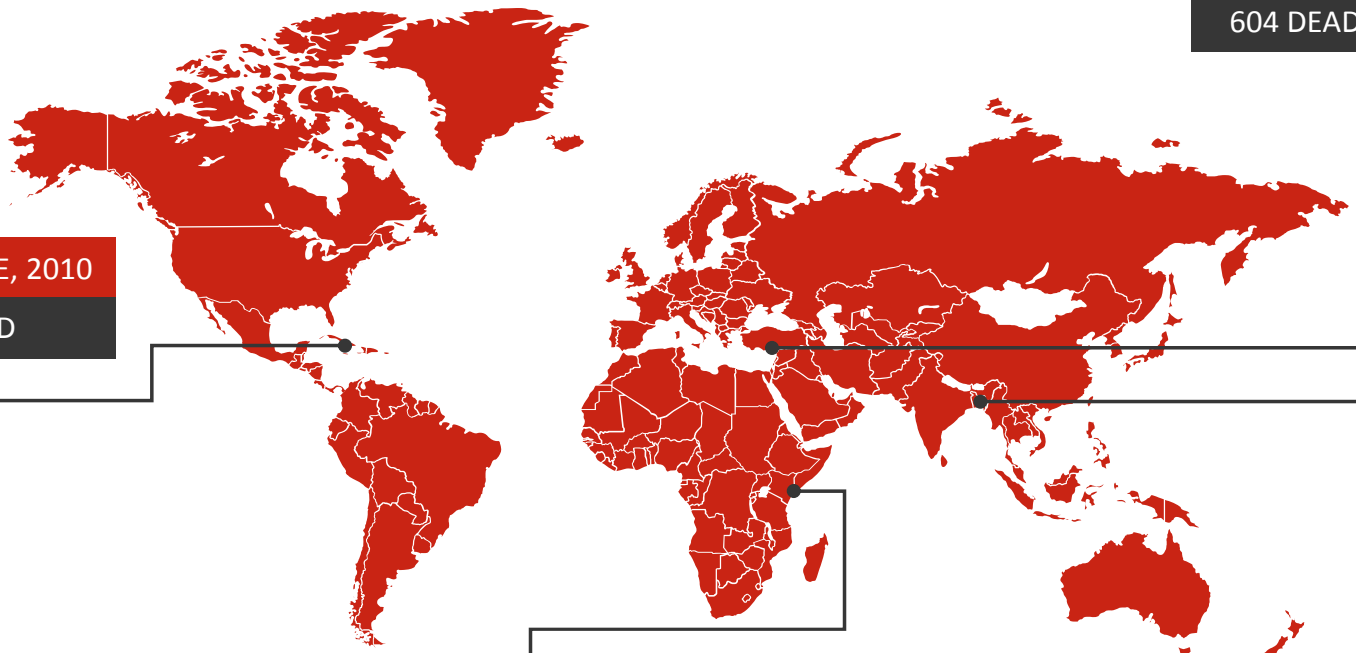
WMR



HAITI EARTHQUAKE, 2010

316,000 DEAD

TURKEY EARTHQUAKE, 2011

604 DEAD, 4,152 INJURED

KENYA BUILDING COLLAPSE, 2016

49 DEAD, 80 MISSING

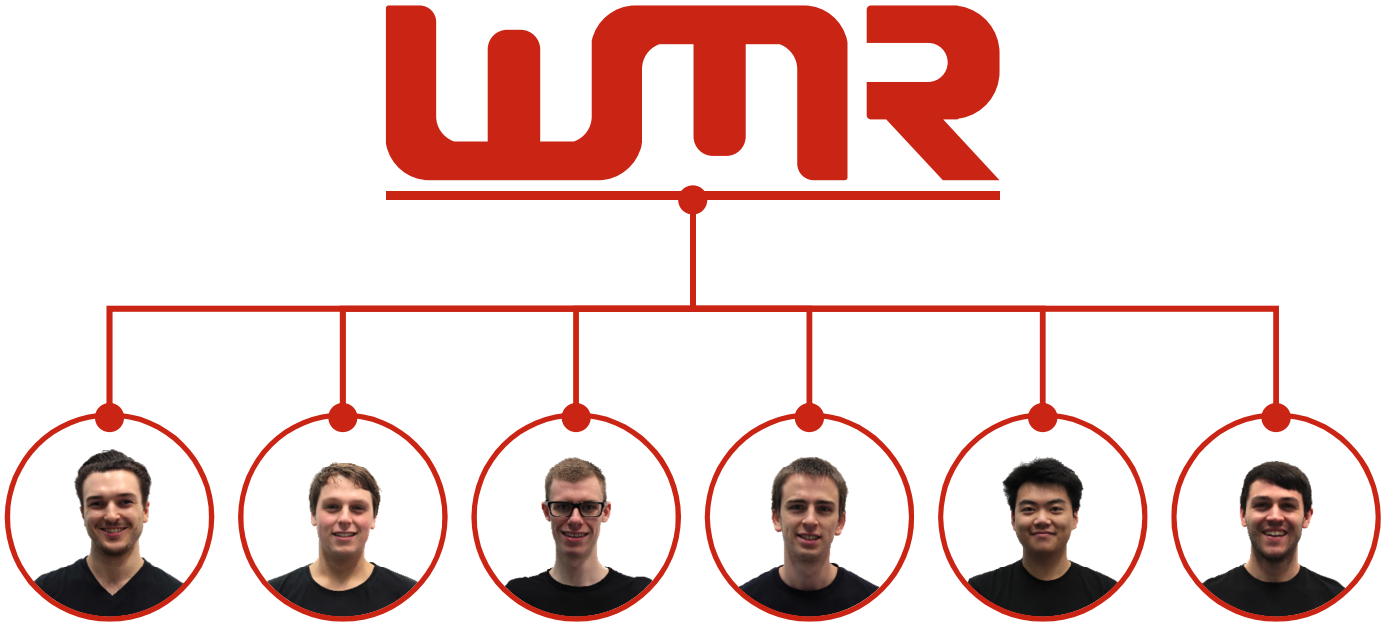
BANGLADESH BUILDING COLLAPSE, 2013

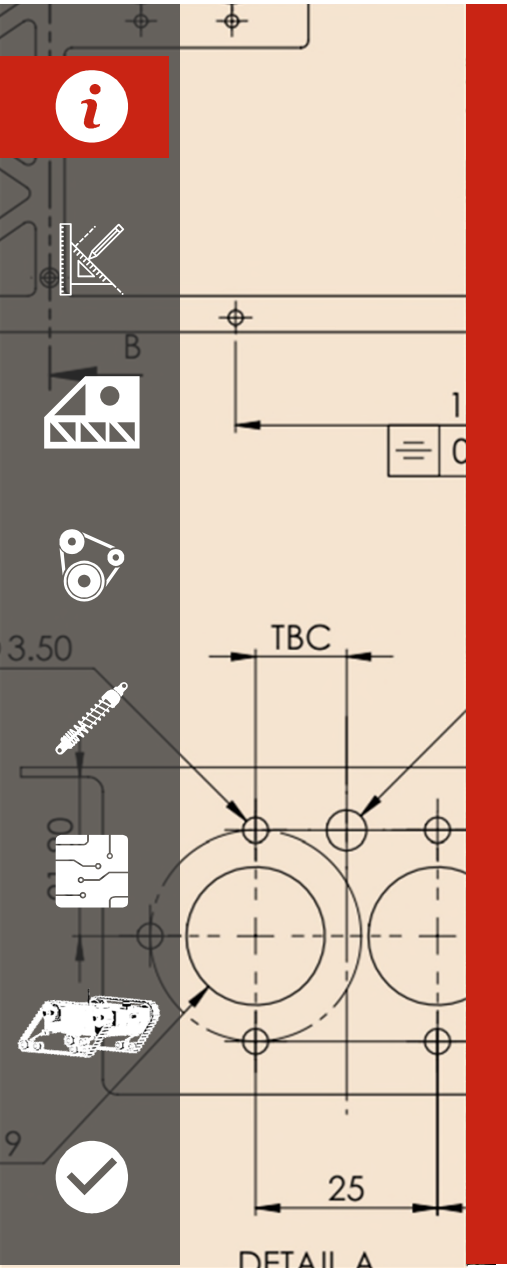
1,129 DEAD, 2,500 INJURED

WMR TEAM 2015/16

INTRODUCTION

JOSEPH **FLANNERY**





ROADMAP

PROJECT OVERVIEW

YUNG-YU **LAU**

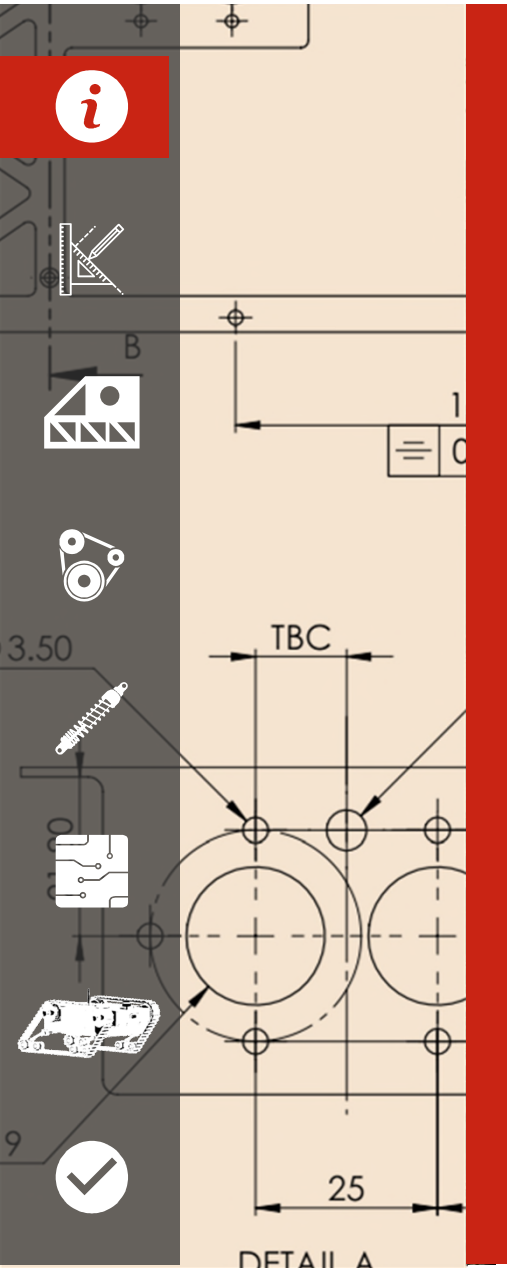
WMR Roadmap

Year 1
- Chassis designed and manufactured
- Drivetrain and suspension design and manufactured
- Power board designed and manufactured

2
- Redesign and manufacture powerboard including battery monitoring
- Redesign and manufacture chassis, suspension and drivetrain
- Drivetrain controlled via PS3 controller
- Modular architecture and infrastructure implemented

3
- Design and manufacture robotic arm and end-effector
- Sensor array operating over network using ROS
- Attend the RoboCup for in-field testing
- Configure subsystems to function with heartbeats

4
- Develop fully functional GUI
- Implement changes resulting from previous year's RoboCup testing
- Investigate the need for a second battery



AIMS AND OBJECTIVES

PROJECT OVERVIEW

YUNG-YU **LAU**

Raise Awareness

Develop and Design

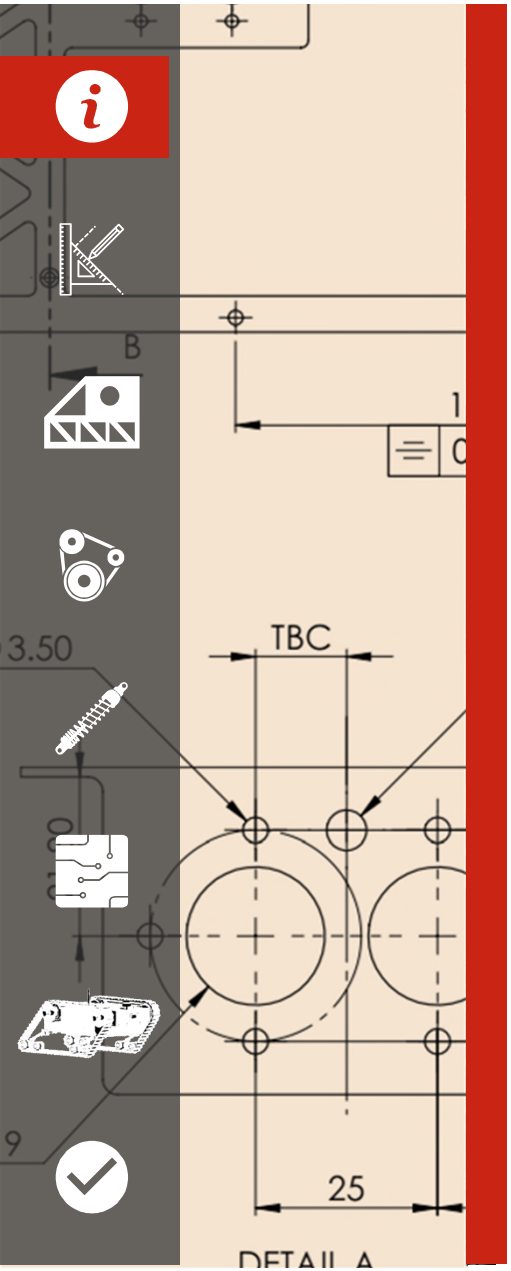
Platform for *RoboCup*

Critical Review of Orion

Deliver a robot for WMR 2016/17

Relationships between suppliers and institutions

Inspire into Engineering and Technology



PROJECT TIMELINE

PROJECT OVERVIEW

YUNG-YU **LAU**

Project Commences — 29 Sept 2015

Aims and Objectives — 6 Oct 2015

Complete Benchmarking — 25 Oct 2015

Submit Detailed Designs — 11 Jan 2016

Start Manufacture — 25 Jan 2016

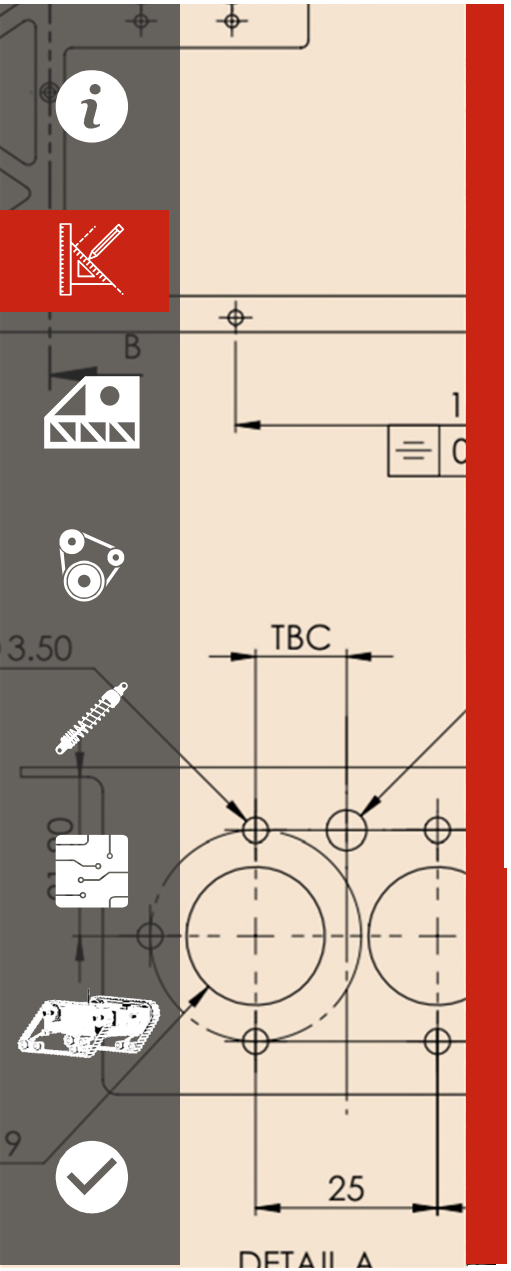
Assembly — 29 Feb 2016

Testing — 14 March 2016

Project Evaluation — 4 April 2016

Technical Report — 05 May 2016

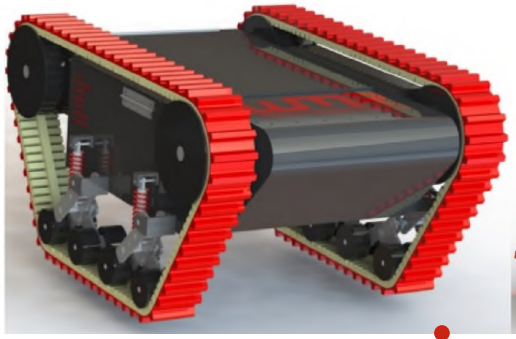
Project Complete — 15 May 2016



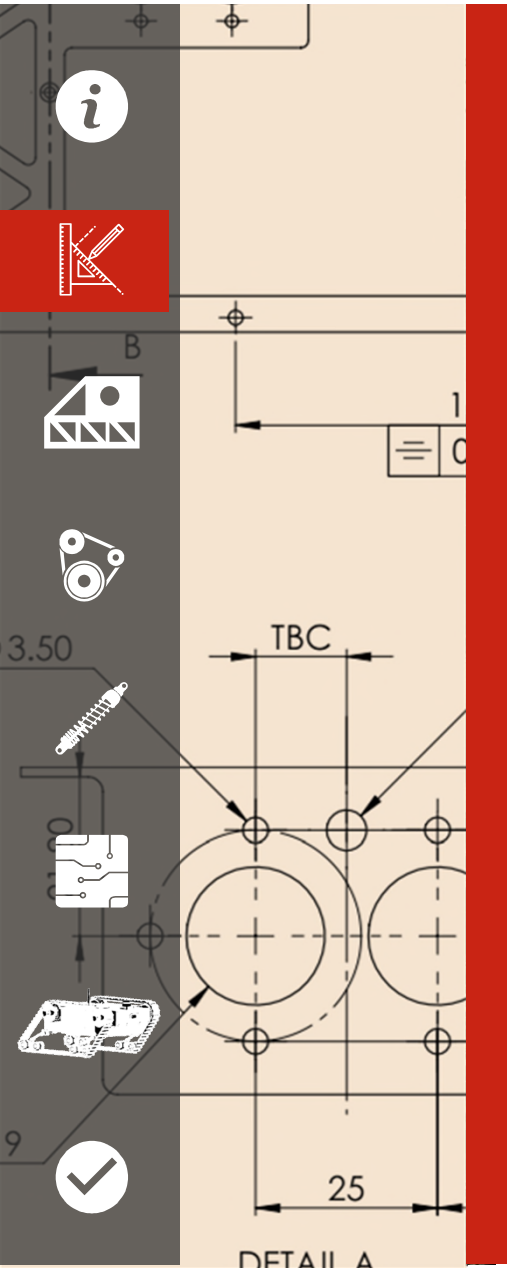
SPECIFICATION

PROJECT DESIGN

YUNG-YU **LAU**



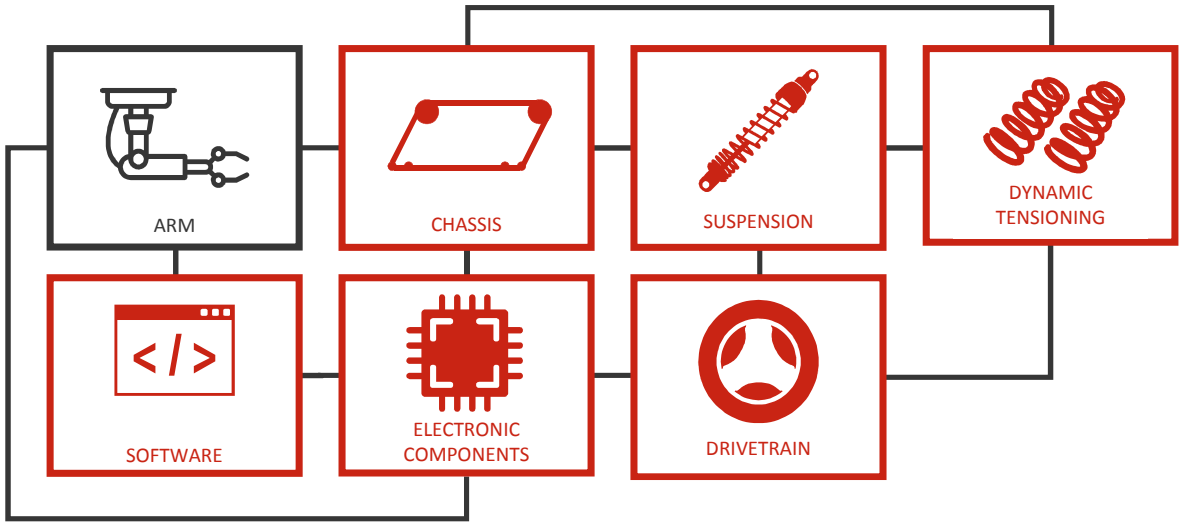
Miniature USAR

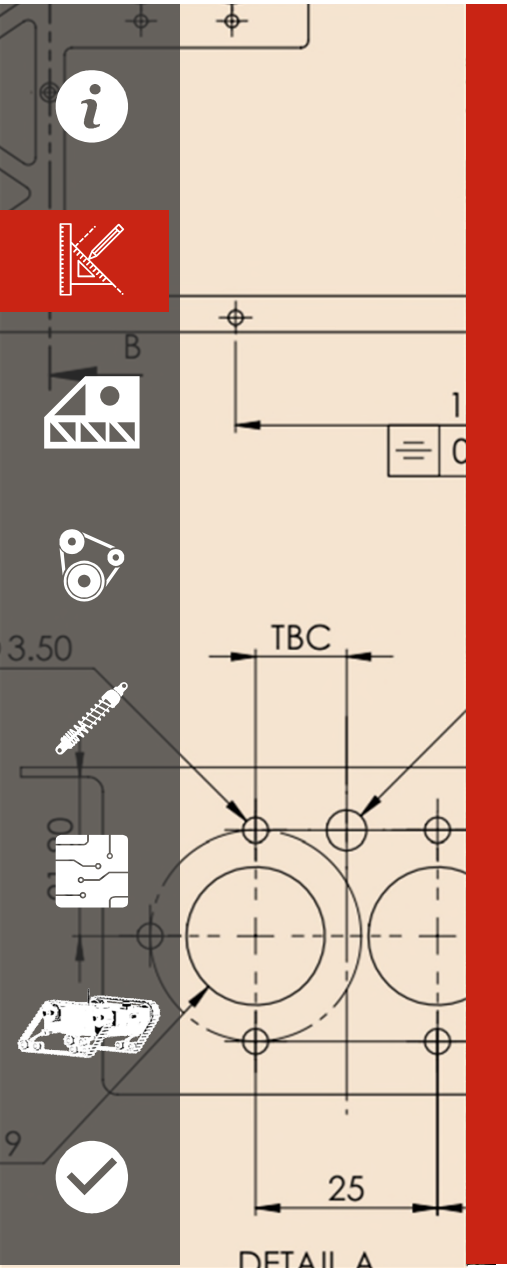


SYSTEM

PROJECT DESIGN

YUNG-YU **LAU**

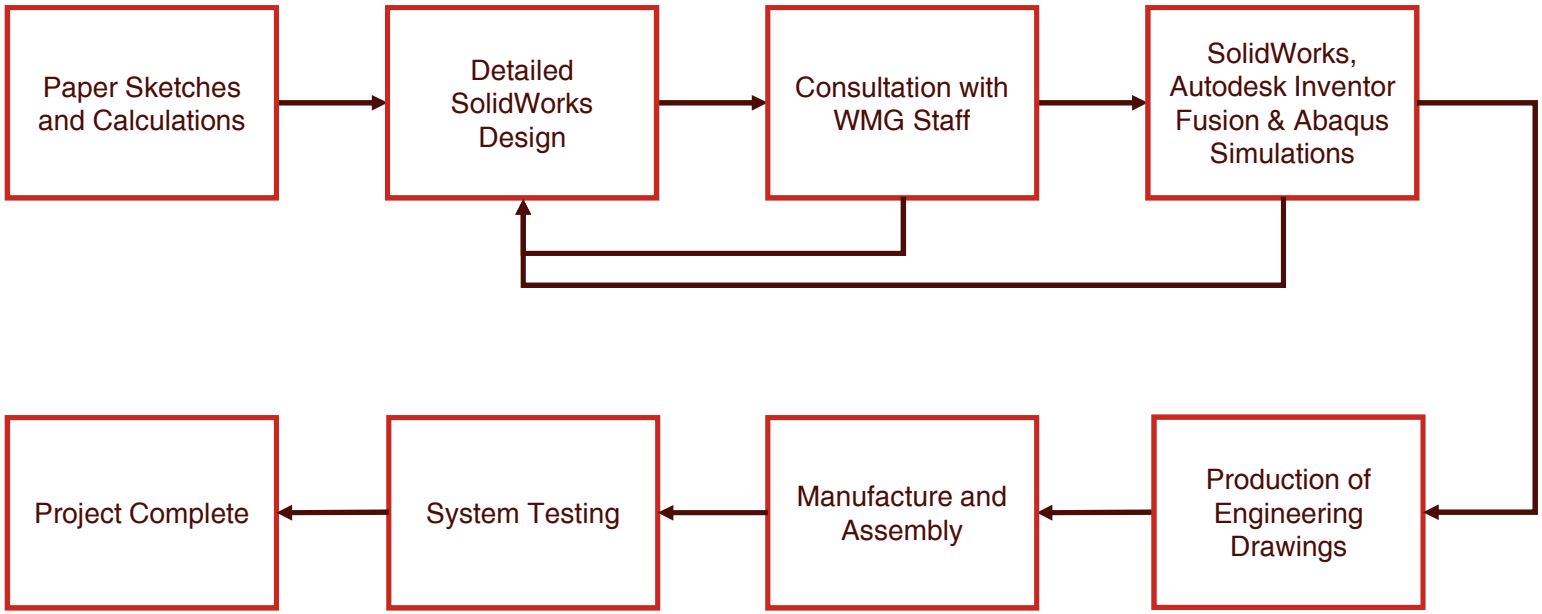


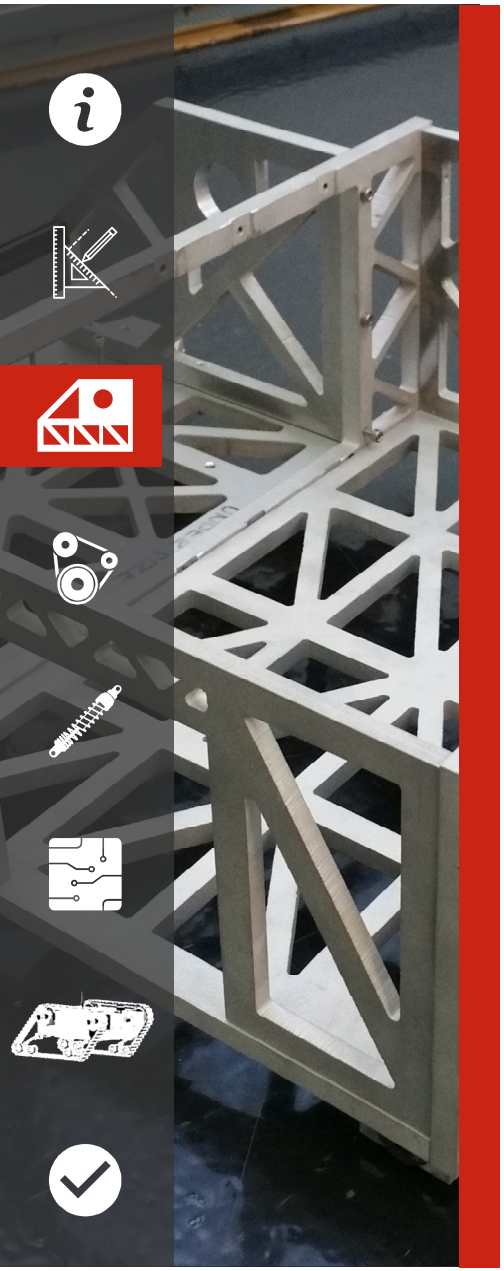


DESIGN STRATEGY

PROJECT DESIGN

YUNG-YU **LAU**

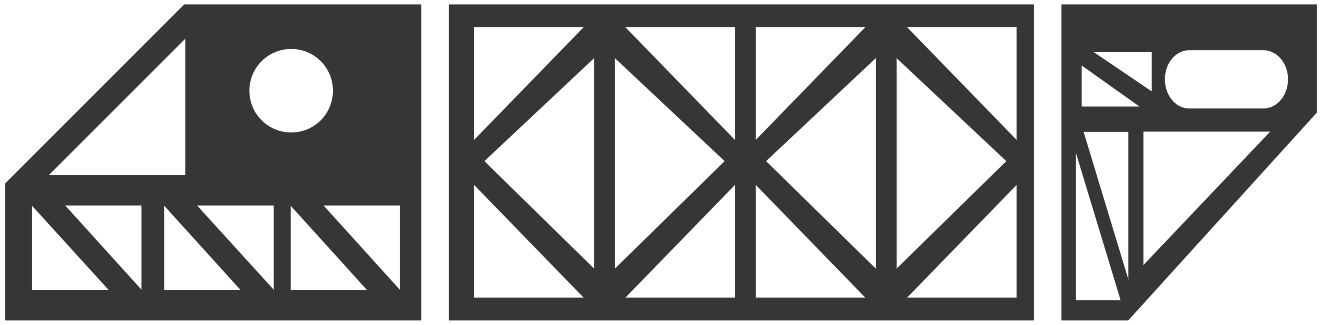




A MODULAR APPROACH

CHASSIS

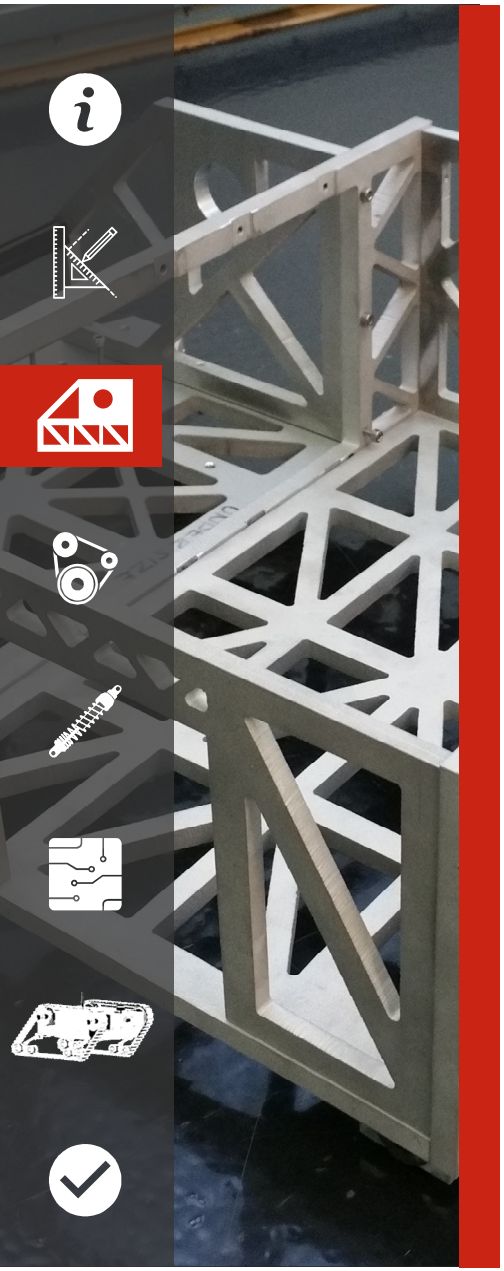
HARVEY **FRANCIS**



MOTORS
CONTROLLERS

BATTERY
CONTROL ELECTRONICS

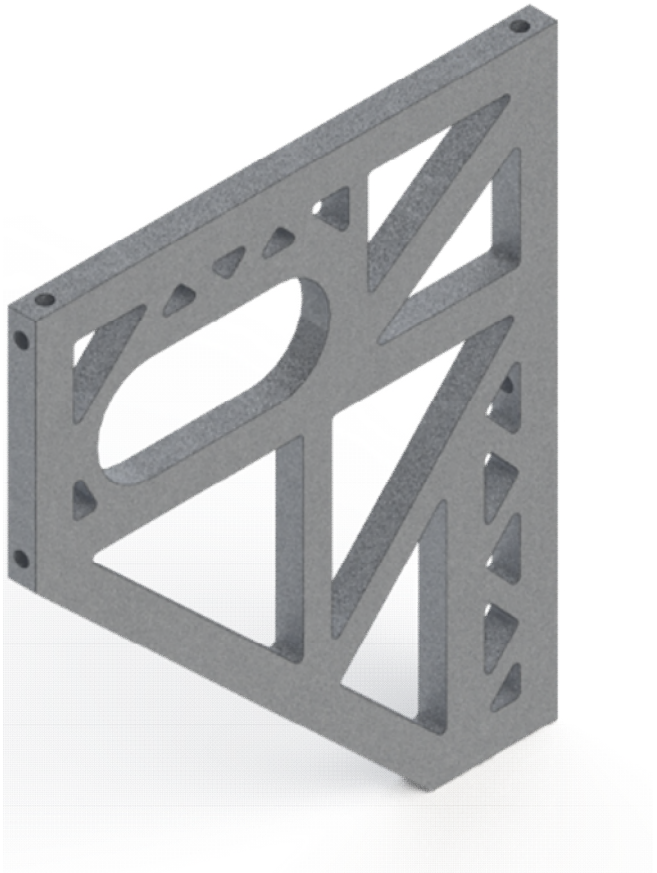
DYNAMIC
TENSIONING
SENSORS



WEIGHT REDUCTION

CHASSIS

HARVEY **FRANCIS**

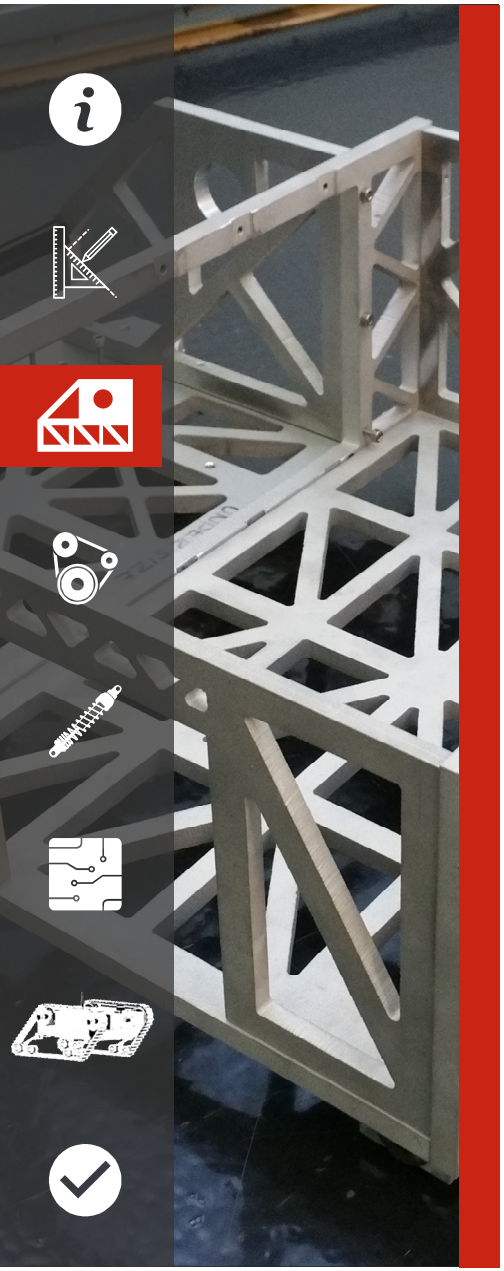


WEIGHT

KG

COST

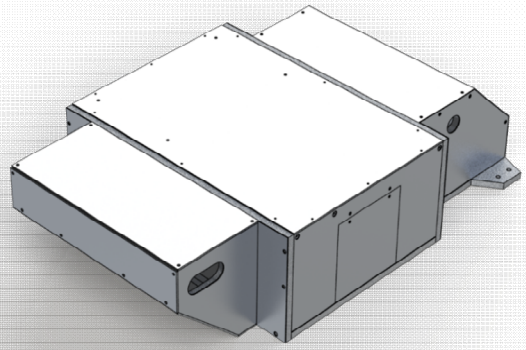
£

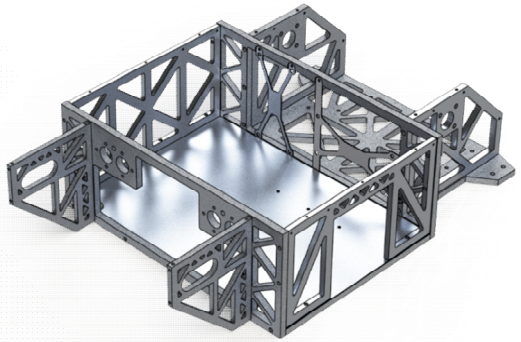


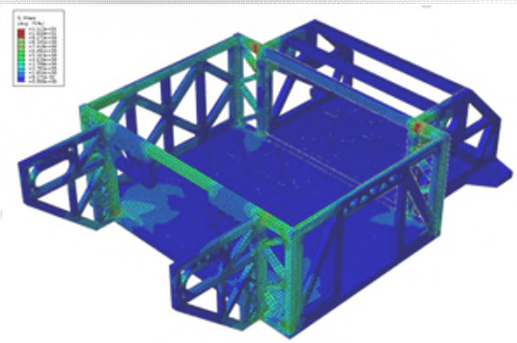
FINAL DESIGN

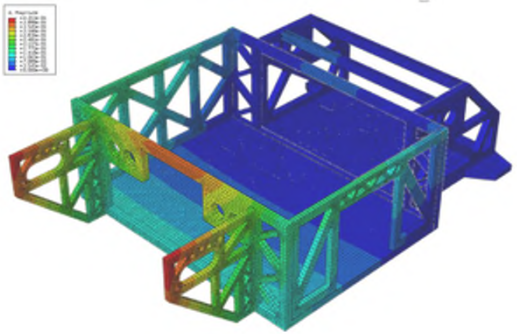
CHASSIS

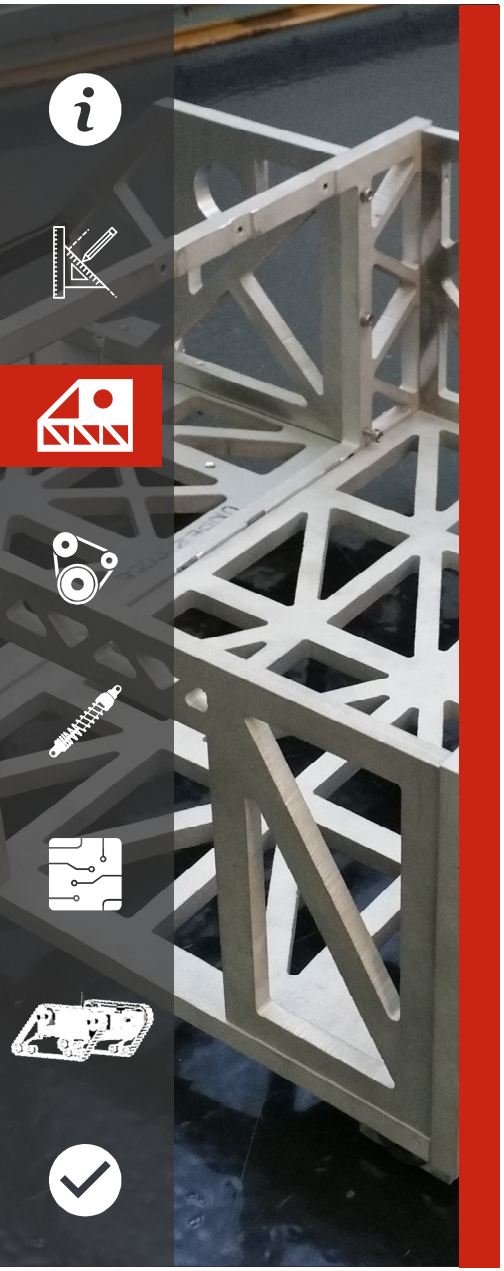
HARVEY **FRANCIS**











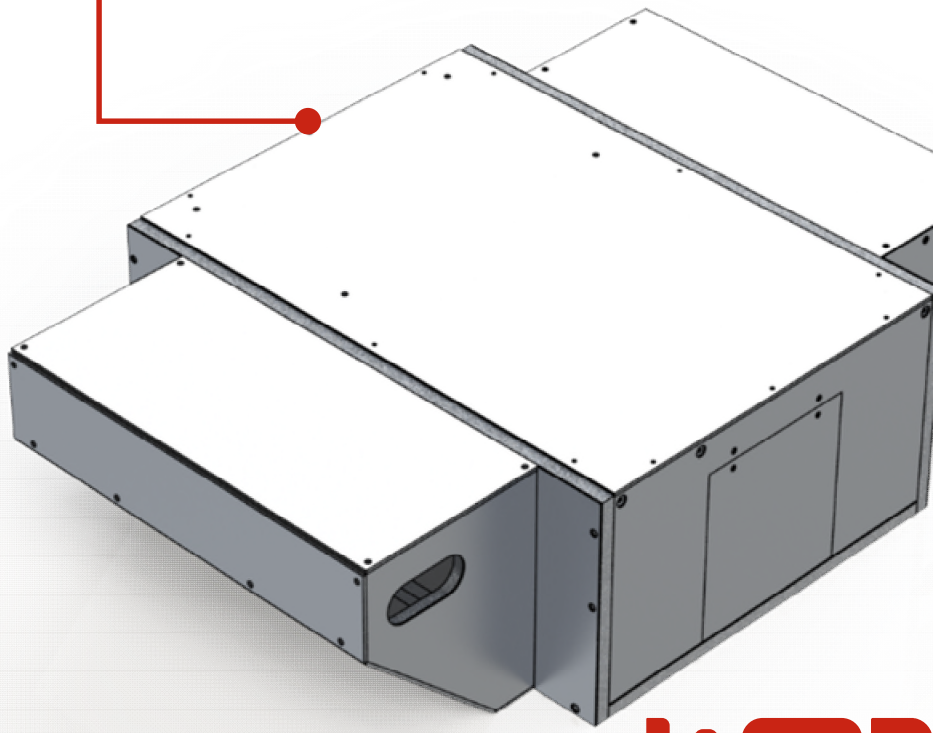
FINAL DESIGN

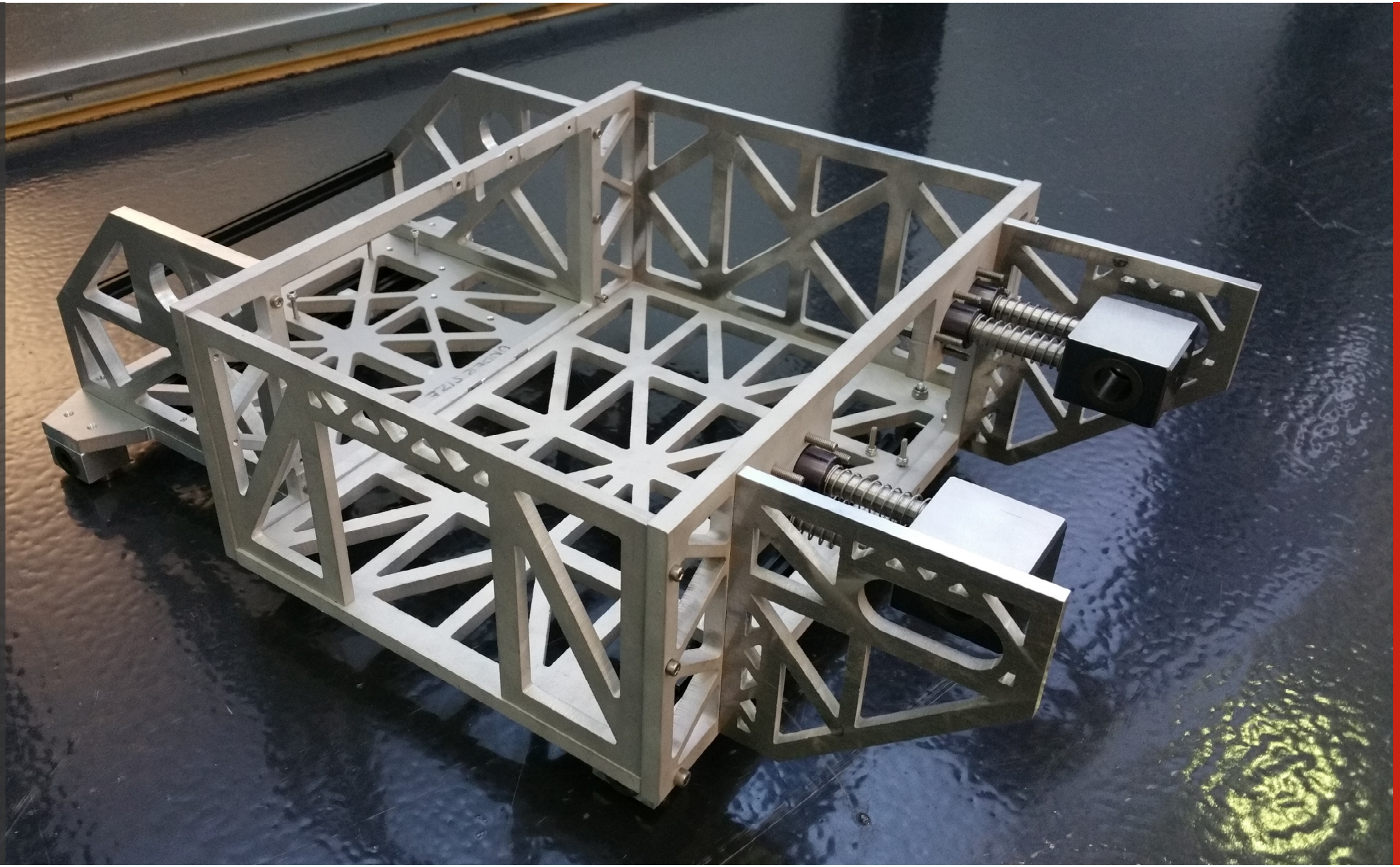
CHASSIS

HARVEY **FRANCIS**

KEY ACHIEVEMENTS

- 21%
- 85%
- 0.4mm
- 61%





ORION ANALYSIS

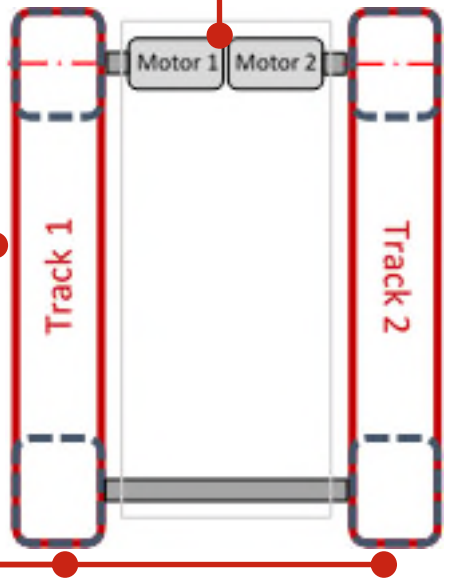
DRIVETRAIN

JOSEPH **FLANNERY**

DUAL DRIVE

TRACKS

SKID STEERING



CYCLONE’S DRIVETRAIN

DRIVETRAIN

JOSEPH **FLANNERY**

KEY ACHIEVEMENTS

- 3.45 Nm
- 0.43m/s
- 67.76%
- £1,437.34

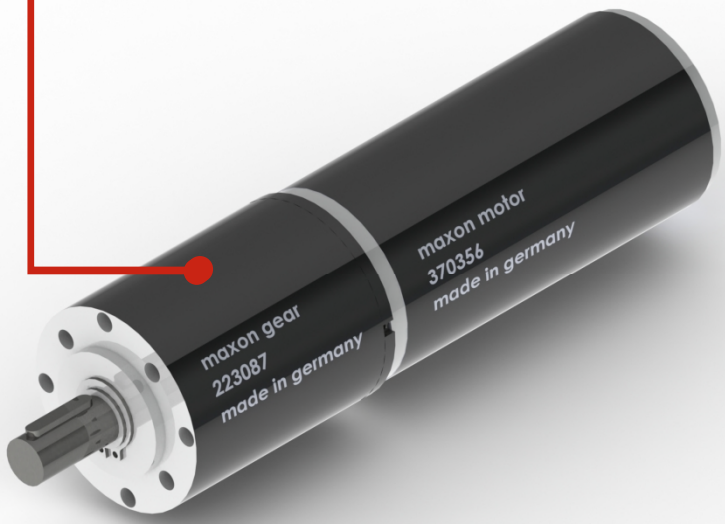
CYCLONE'S DRIVETRAIN

DRIVETRAIN

JOSEPH **FLANNERY**

KEY ACHIEVEMENTS

- 8.68 Nm
- 0.33m/s
- 78.02%
- £1,025.82










CYCLONE'S DRIVETRAIN

DRIVETRAIN

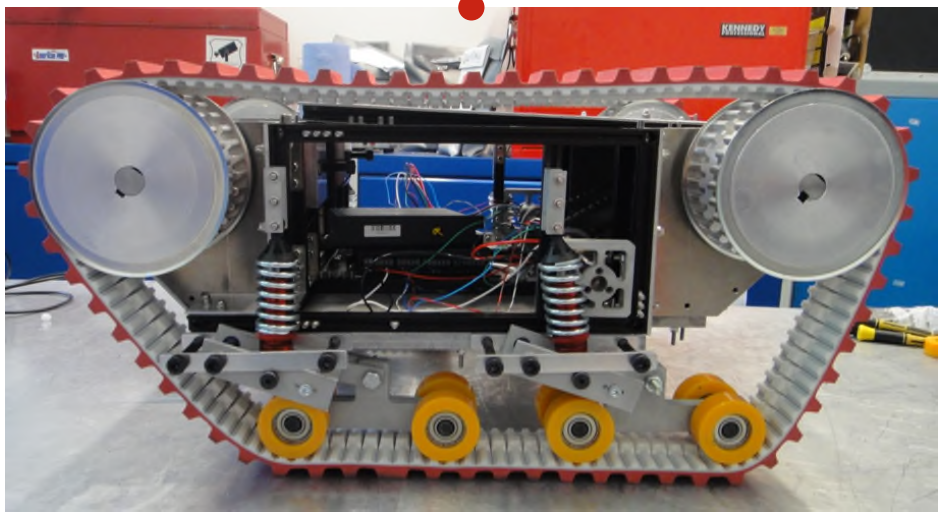
JOSEPH **FLANNERY**

INSERT THE RENDER HERE OF
THE MOTORS IN THE

ORION ANALYSIS

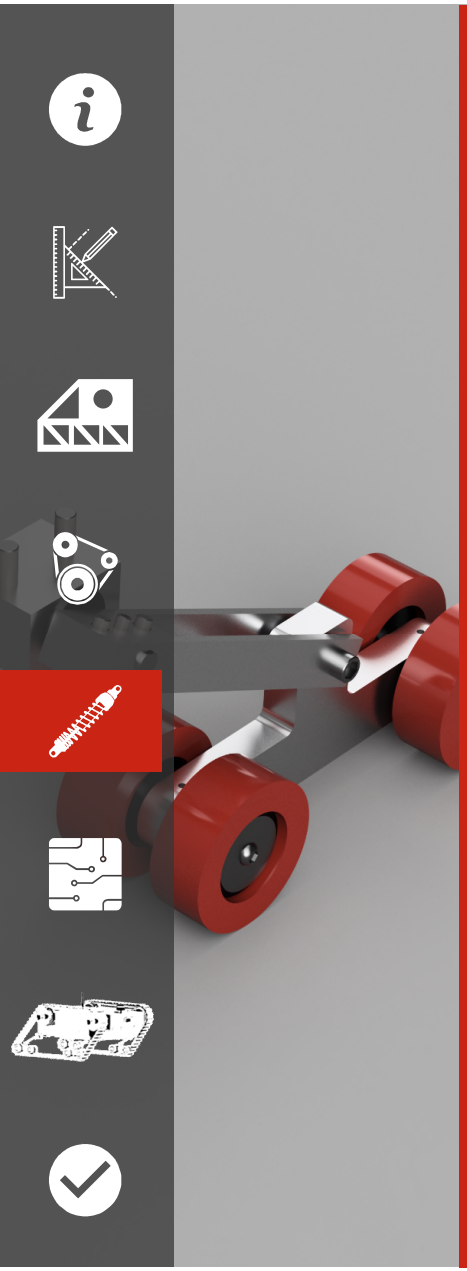
SUSPENSION

MAX **GLOGER**



KEY ISSUES

- 12mm
- Non-adjustable
- Reduced volume



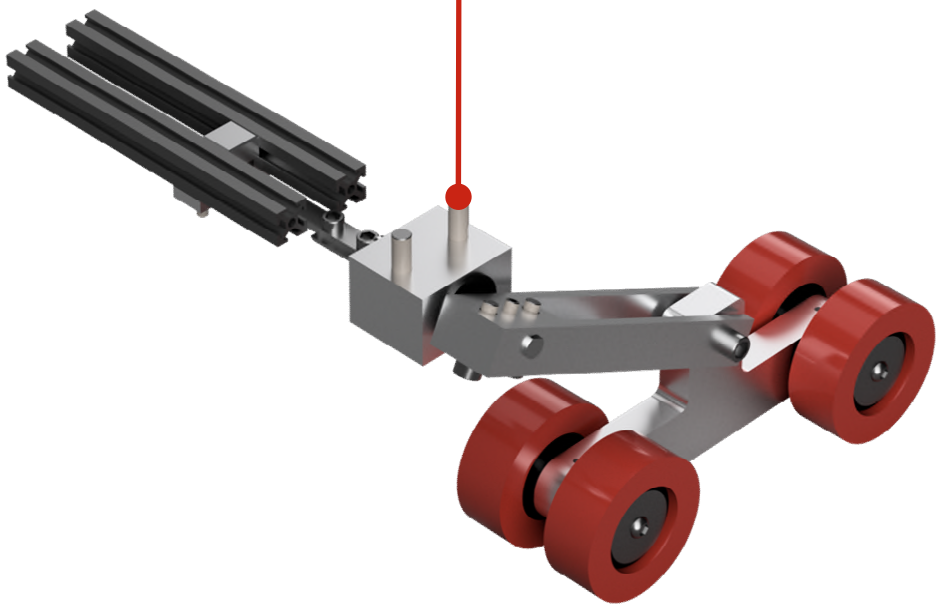
CYCLONE ANALYSIS

SUSPENSION

MAX **GLOGER**

KEY ACHIEVEMENTS

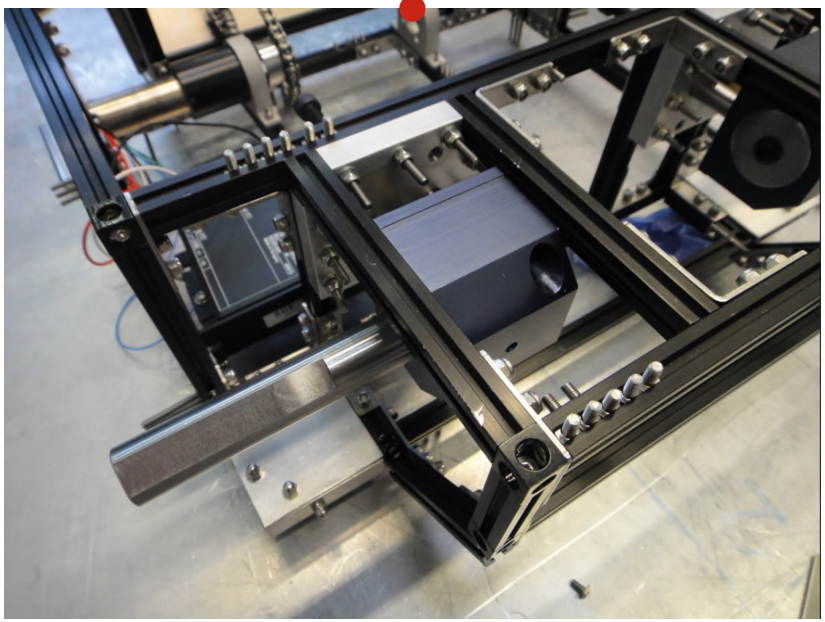
- 27.4mm
- Adjustable
- Vol. not reduced



ORION ANALYSIS

DYNAMIC TENSIONING

MAX **GLOGER**



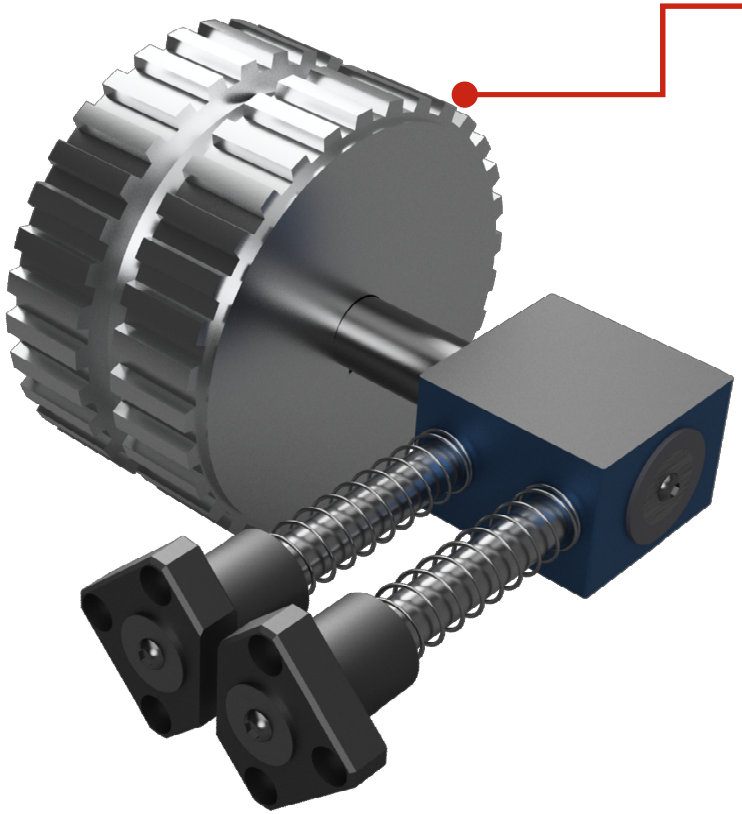
KEY ISSUES

- Static
- No bearing

ORION ANALYSIS

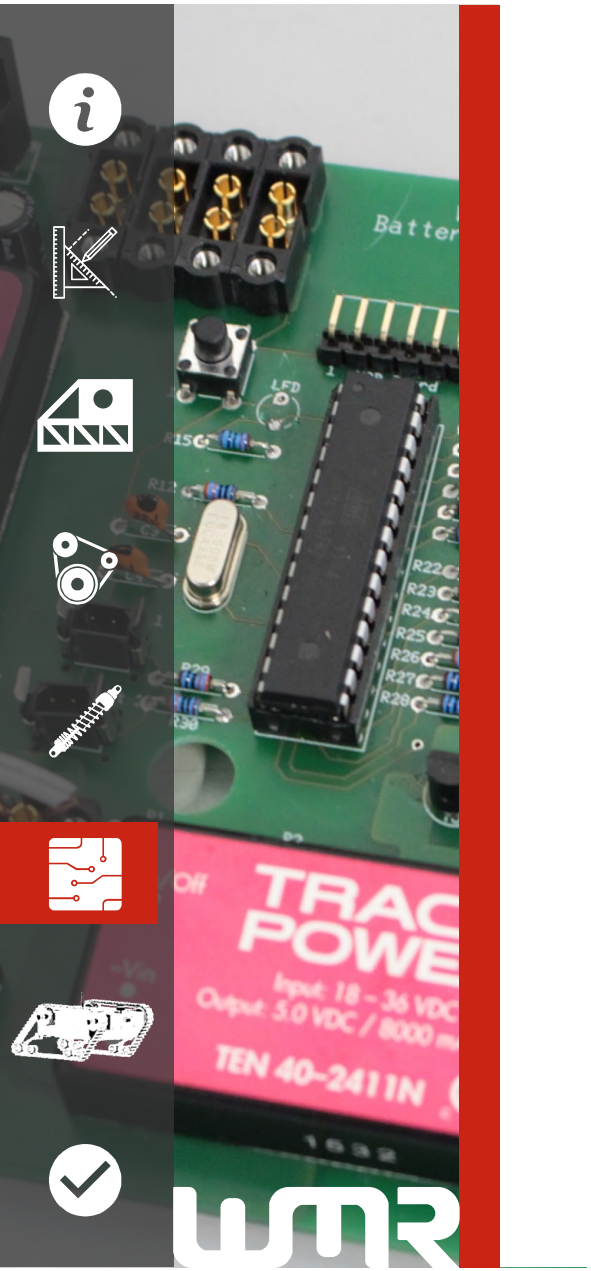
DYNAMIC TENSIONING

MAX **GLOGER**



KEY ACHIEVEMENTS

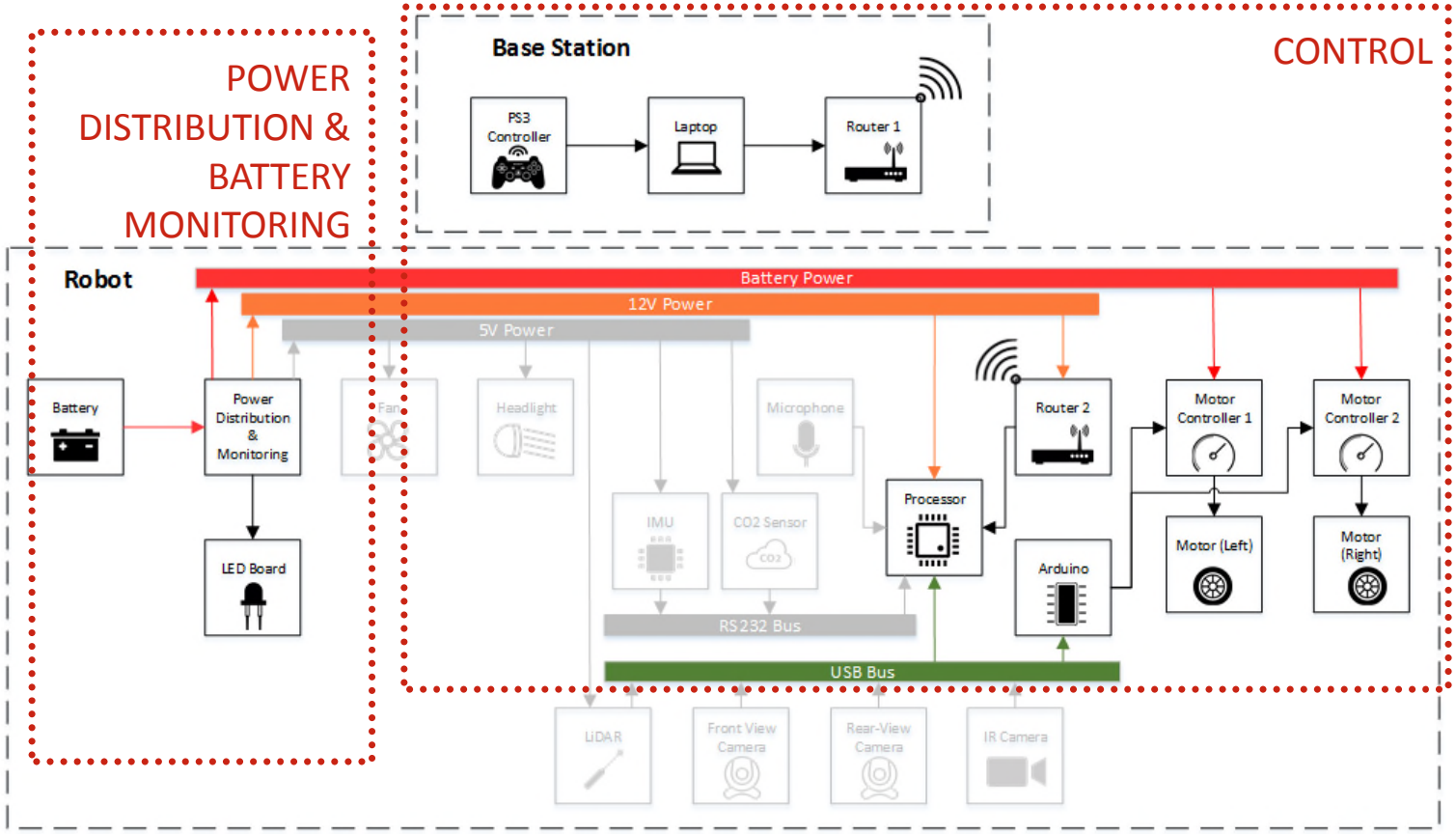
- Dynamic
- Bearings

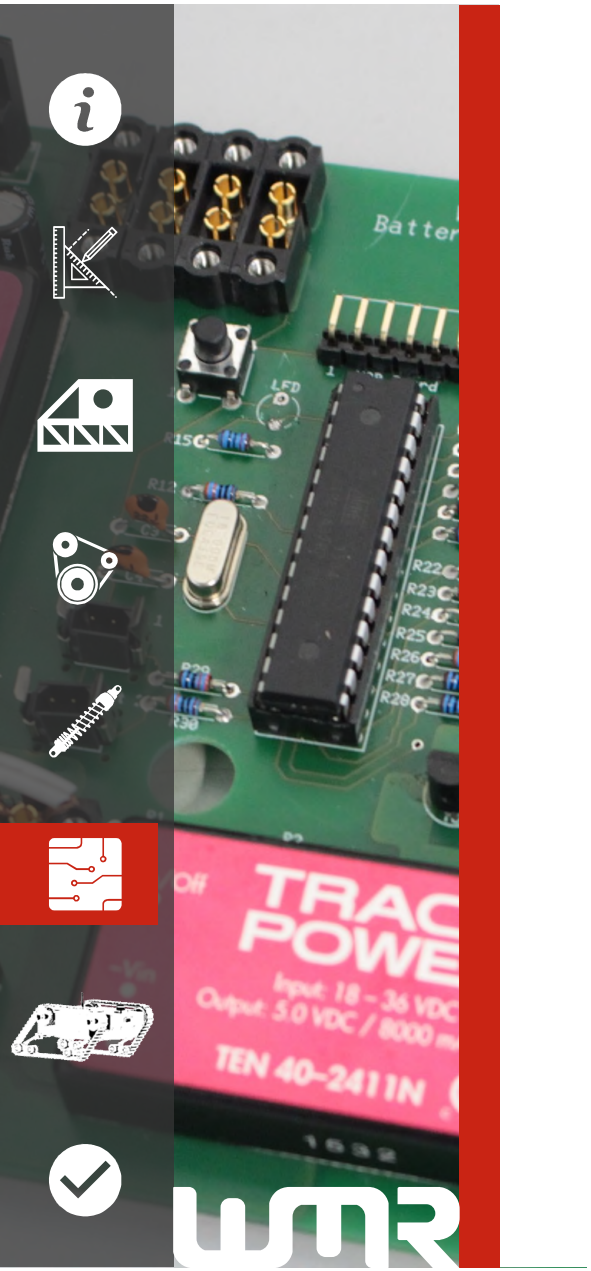


NEW ARCHIETECTURE OVERVIEW

ELECTRONICS & SOFTWARE

DANIEL **RILEY**





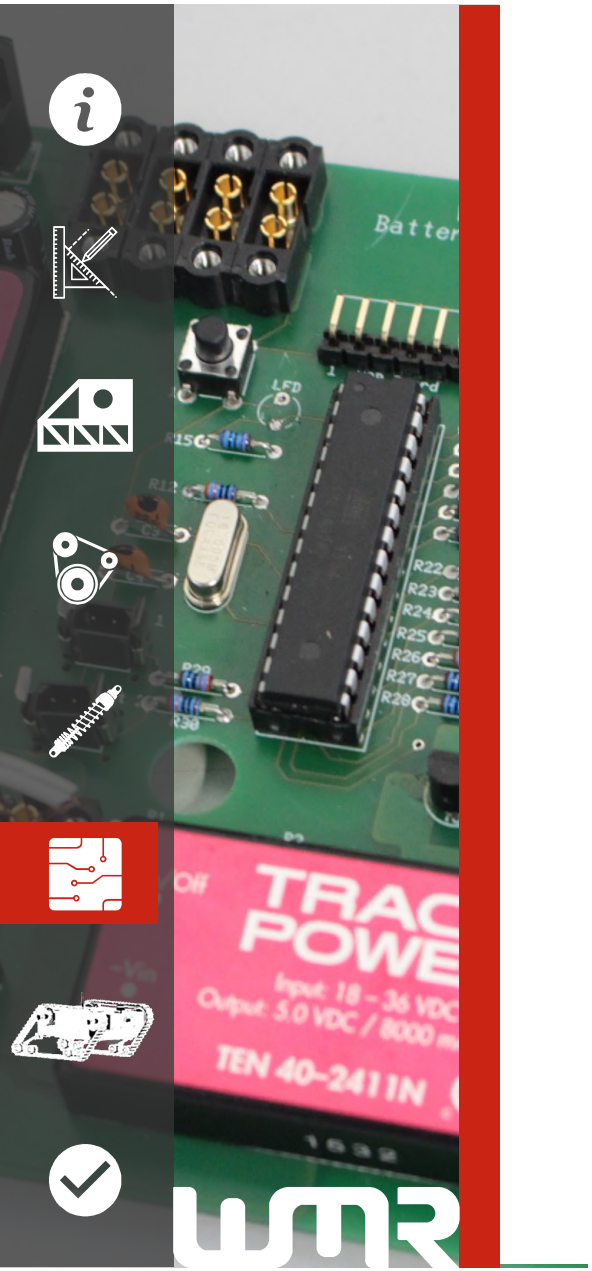
CONTROL ELECTRONICS - COMMUNICATIONS

ELECTRONICS & SOFTWARE

DANIEL **RILEY**

CRITICAL REVIEW 2014/15

- Power Distribution Compatibility
- Limited to 2.4GHz Channels
- Size and Weight



CONTROL ELECTRONICS - COMMUNICATIONS

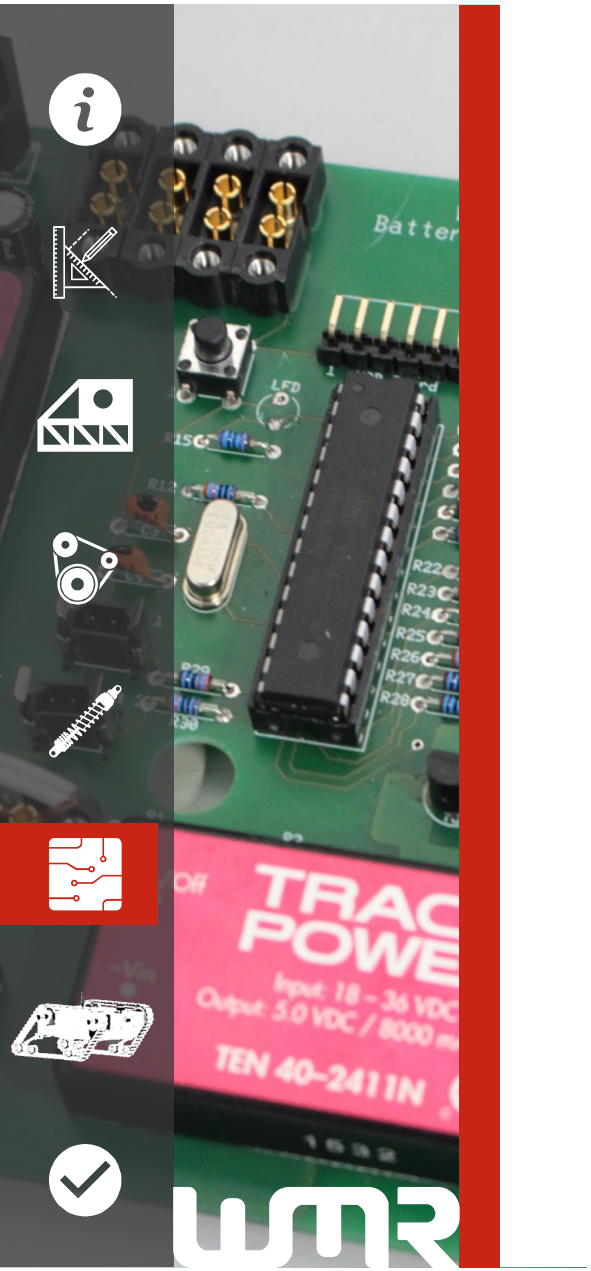
ELECTRONICS & SOFTWARE

DANIEL **RILEY**

D-LINK
DWR-118

BUFFALO
WMR-433

ZyXEL
NGB6503



CONTROL ELECTRONICS - COMMUNICATIONS

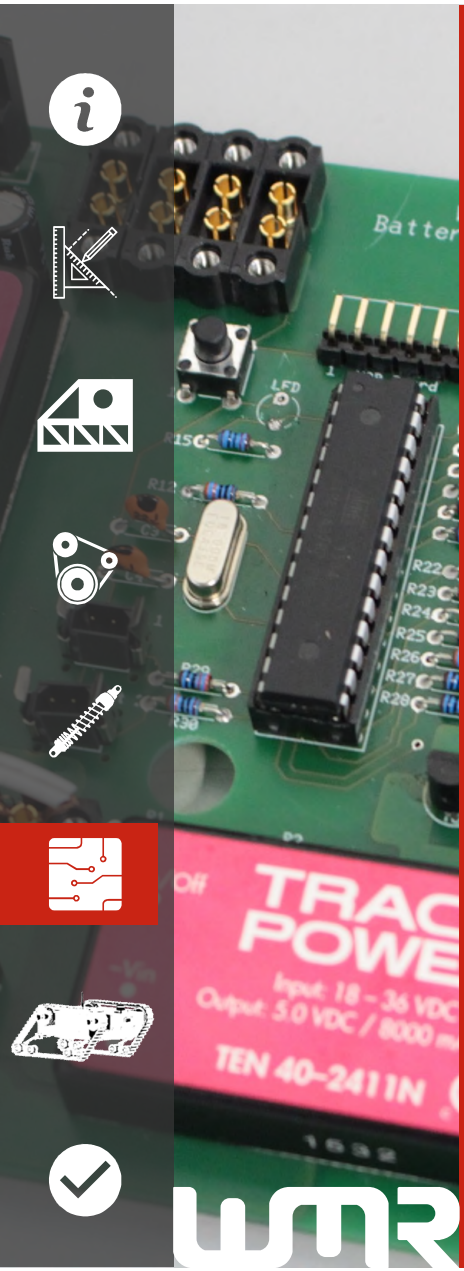
ELECTRONICS & SOFTWARE

DANIEL **RILEY**

D-LINK

- Compatible with Power Distribution
- Gigabit Ethernet
- 35m Max Range
- Expansion to 3G/4G and 5GHz Networks

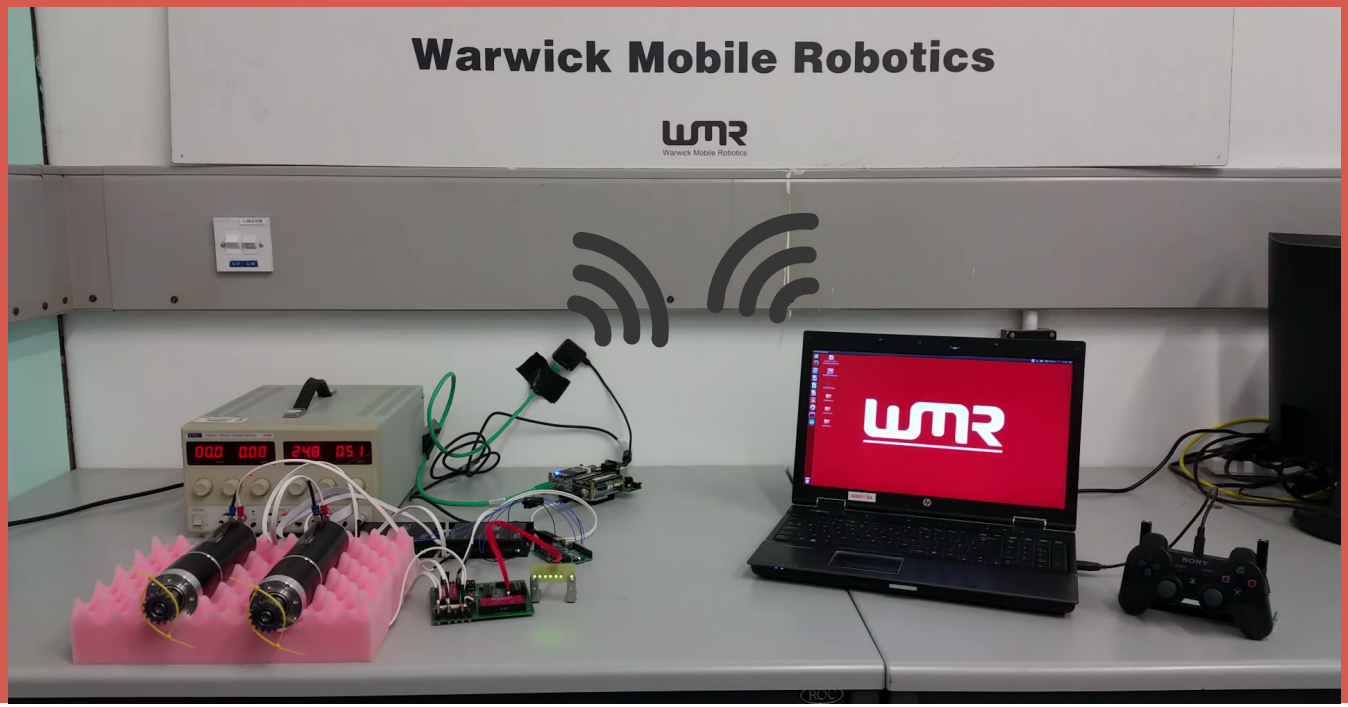
D-LINK DWR-118

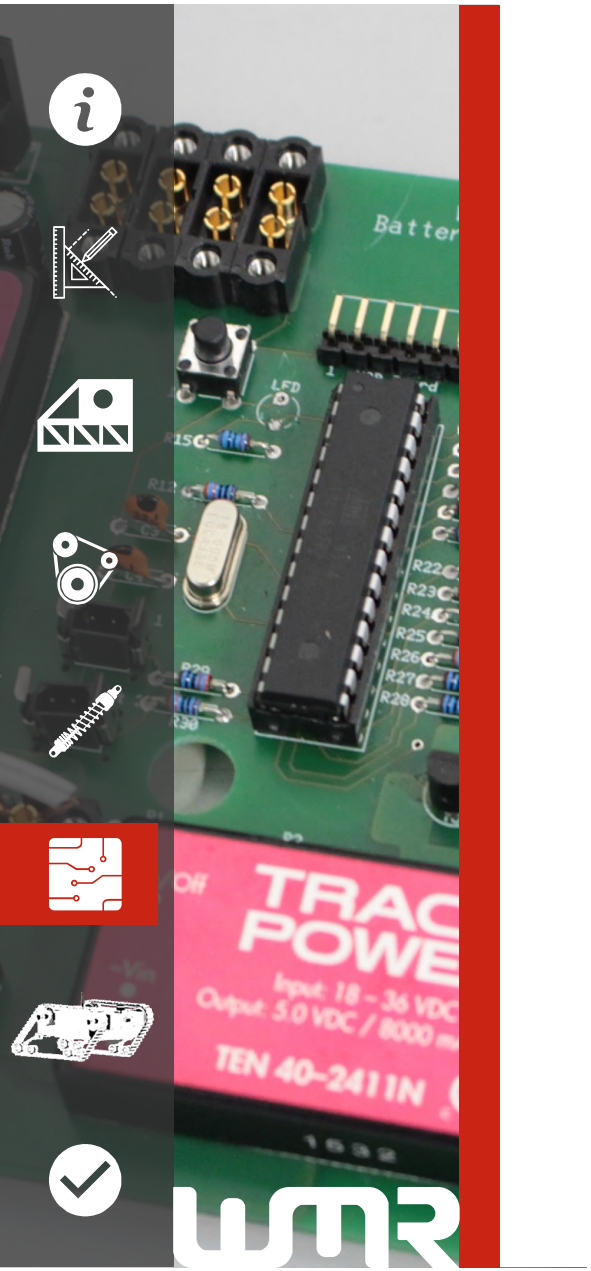


CONTROL ELECTRONICS

ELECTRONICS & SOFTWARE

DANIEL **RILEY**

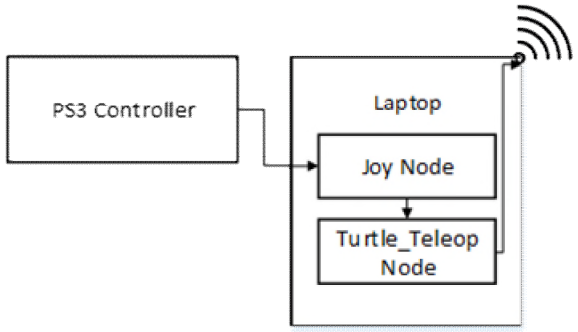


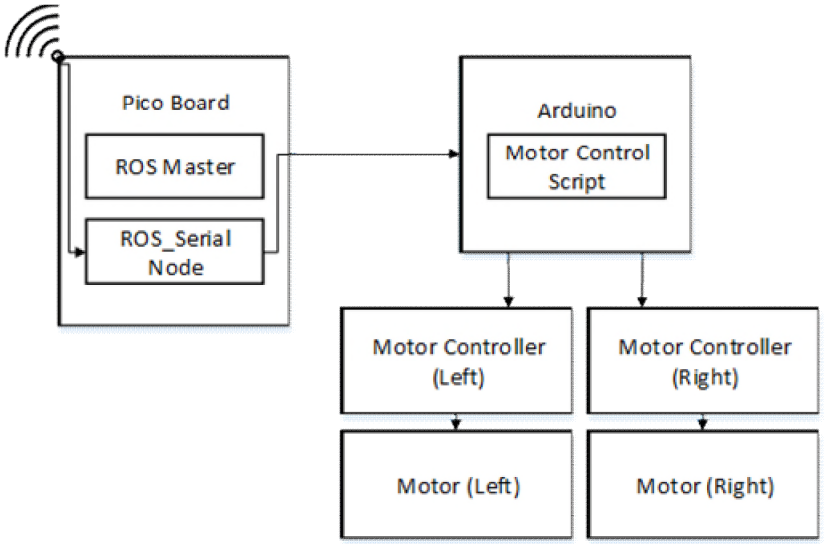


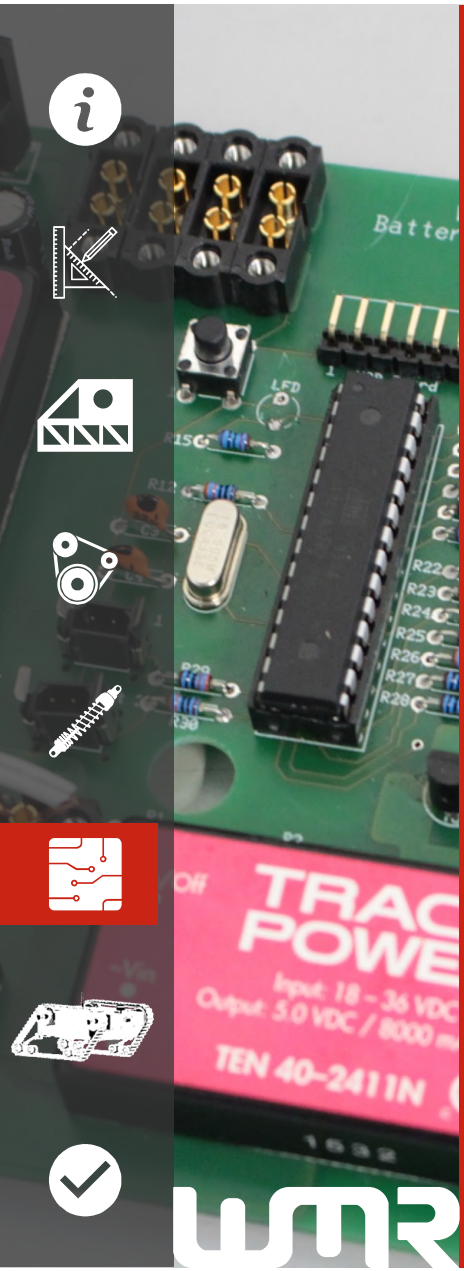
CONTROL ELECTRONICS

ELECTRONICS & SOFTWARE

DANIEL **RILEY**



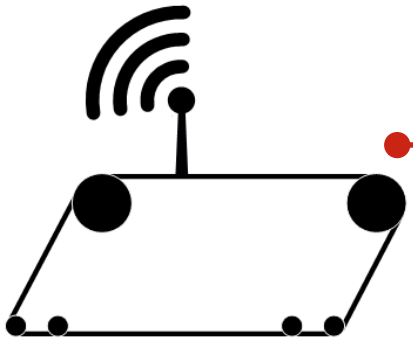




CONTROL ELECTRONICS

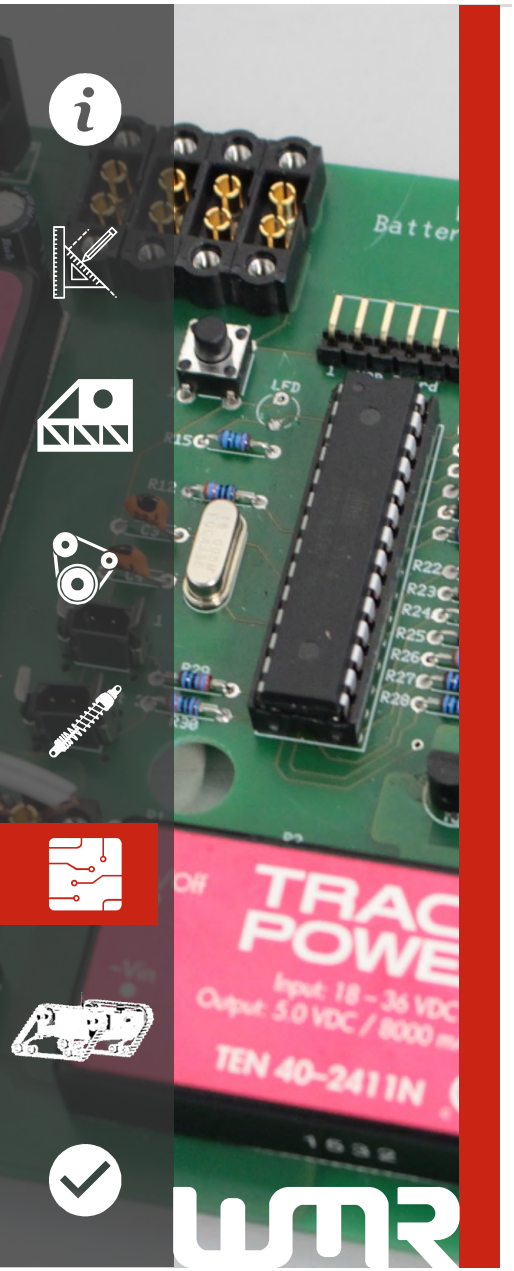
ELECTRONICS & SOFTWARE

DANIEL **RILEY**



KEY FEATURES

- Responsiveness
- Bandwidth
- Tank Style Turning
- Future Expansion



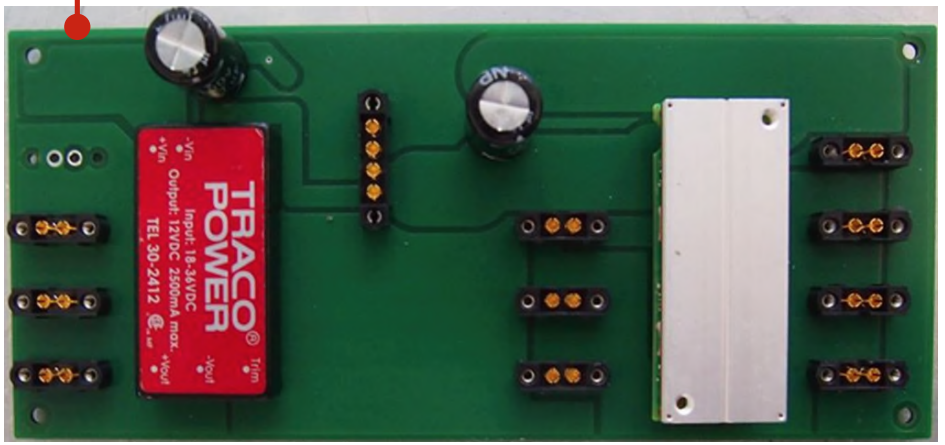
BATTERY MONITORING BOARD

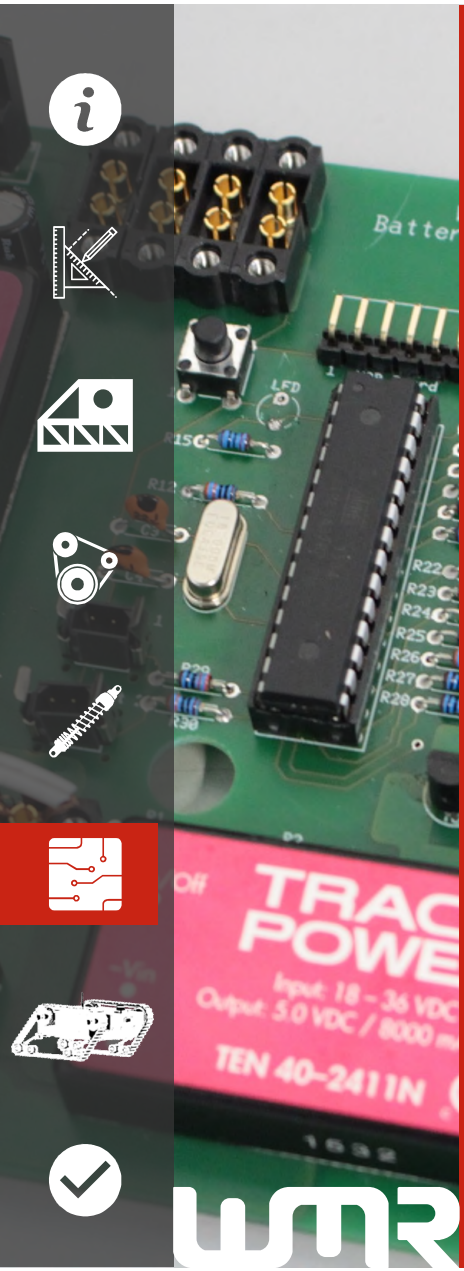
ELECTRONICS & SOFTWARE

DANIEL **RILEY**

CRITICAL REVIEW 2014/15

- No Future Expansion
- No Battery Monitoring
- No Motor Output

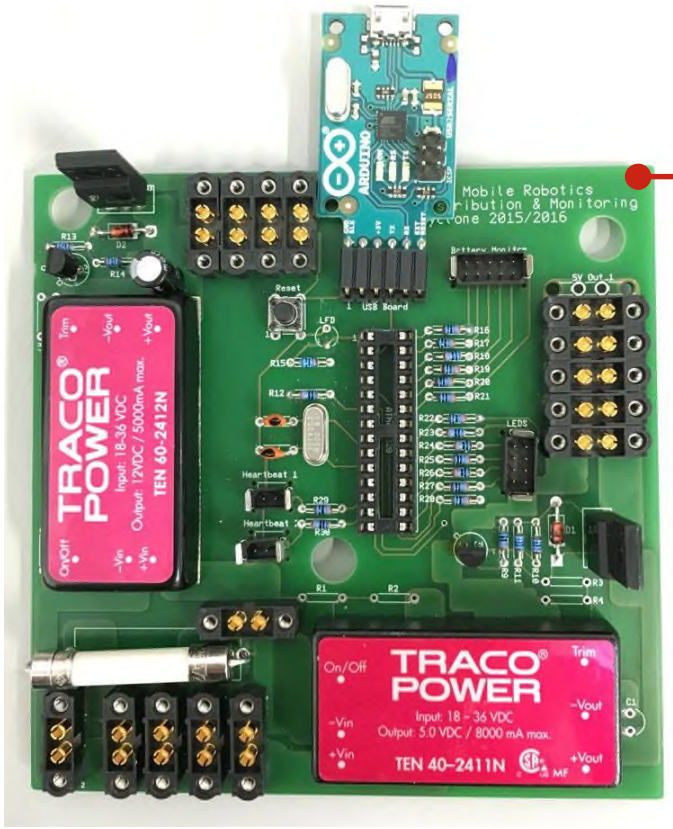




BATTERY MONITORING BOARD

ELECTRONICS & SOFTWARE

DANIEL **RILEY**



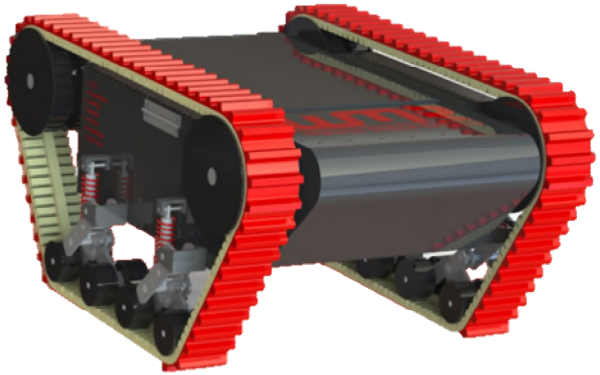
2015/16 CAPABILITIES

- Future Arm Expansion
- Heartbeat Monitoring
- Automatic Shutdown
- Power Status Feedback

COST COMPARISON

CONCLUSIONS

HARVEY **FRANCIS**



MATERIAL PROCUREMENT

£ 4,082.94

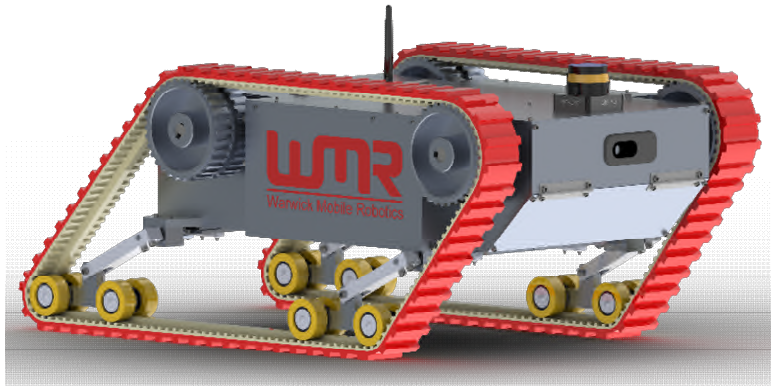
TOTAL COSTING

£ 59,466.94

COST COMPARISON

CONCLUSIONS

HARVEY **FRANCIS**



MATERIAL PROCUREMENT

£ 4,082.94

TOTAL COSTING

£ 59,466.94

BENEFITS

CONCLUSIONS

HARVEY **FRANCIS**

EDUCATION

OUTREACH EVENTS
OPEN DAYS

ACADEMIA

PREVIOUS CITATIONS
DEVELOPING RESEARCH

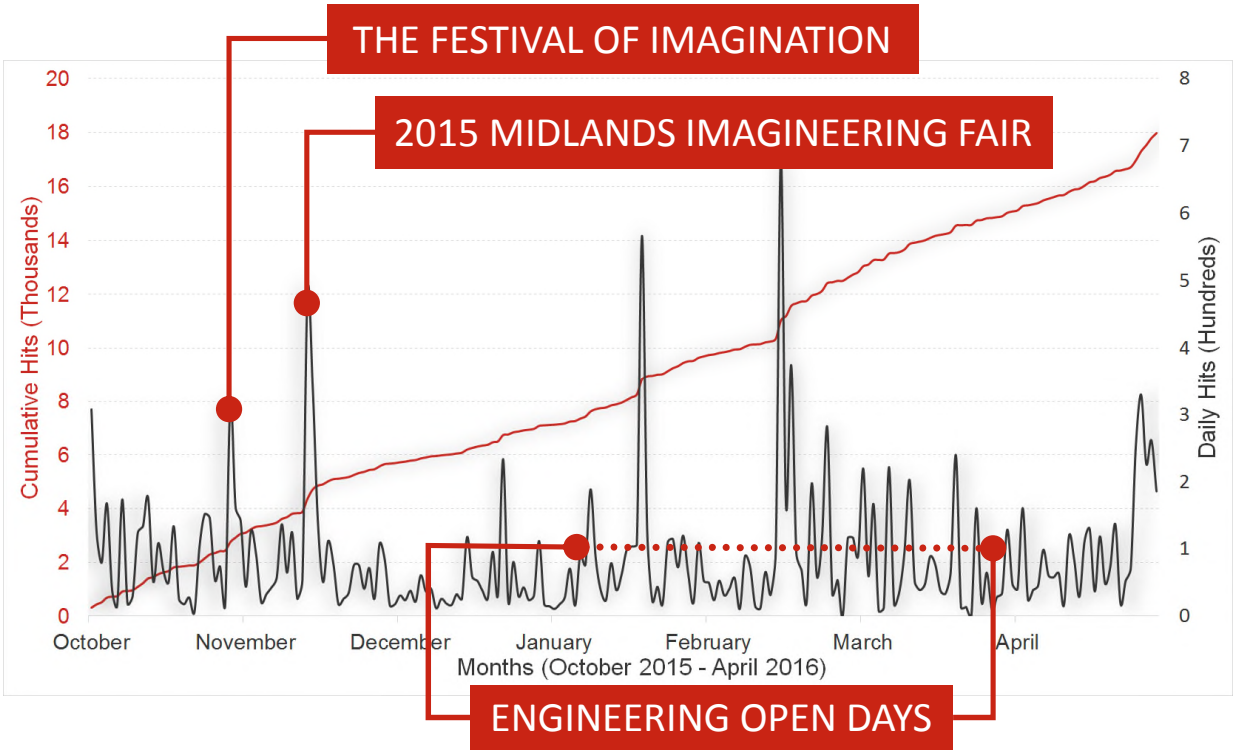
SOCIETY

SUSTAINABLE CITIES
RESEARCH TO PRACTICE

BENEFITS

CONCLUSIONS

HARVEY **FRANCIS**



BENEFITS

CONCLUSIONS

HARVEY **FRANCIS**

SUSTAINABLE CITIES GRP