Robert Potra

BESc. Mechatronic Systems Engineering
Western University

15 months as Visiting Scholar at
Macquarie University

Formula SAE

MACQUARIE University
SYDNEY·AUSTRALIA

Visiting Scholar Engineering Intern

- Mechanical design of specimen-specific, parametric shoulder simulator
- Control system design and implementation with kinematic and force feedback
- Developed software and user-interfaces for conducting biomechanics experiments
- Conducted cadaver biomechanics pilot experiments
- Shoulder Simulator Video
- Shoulder Simulator Article

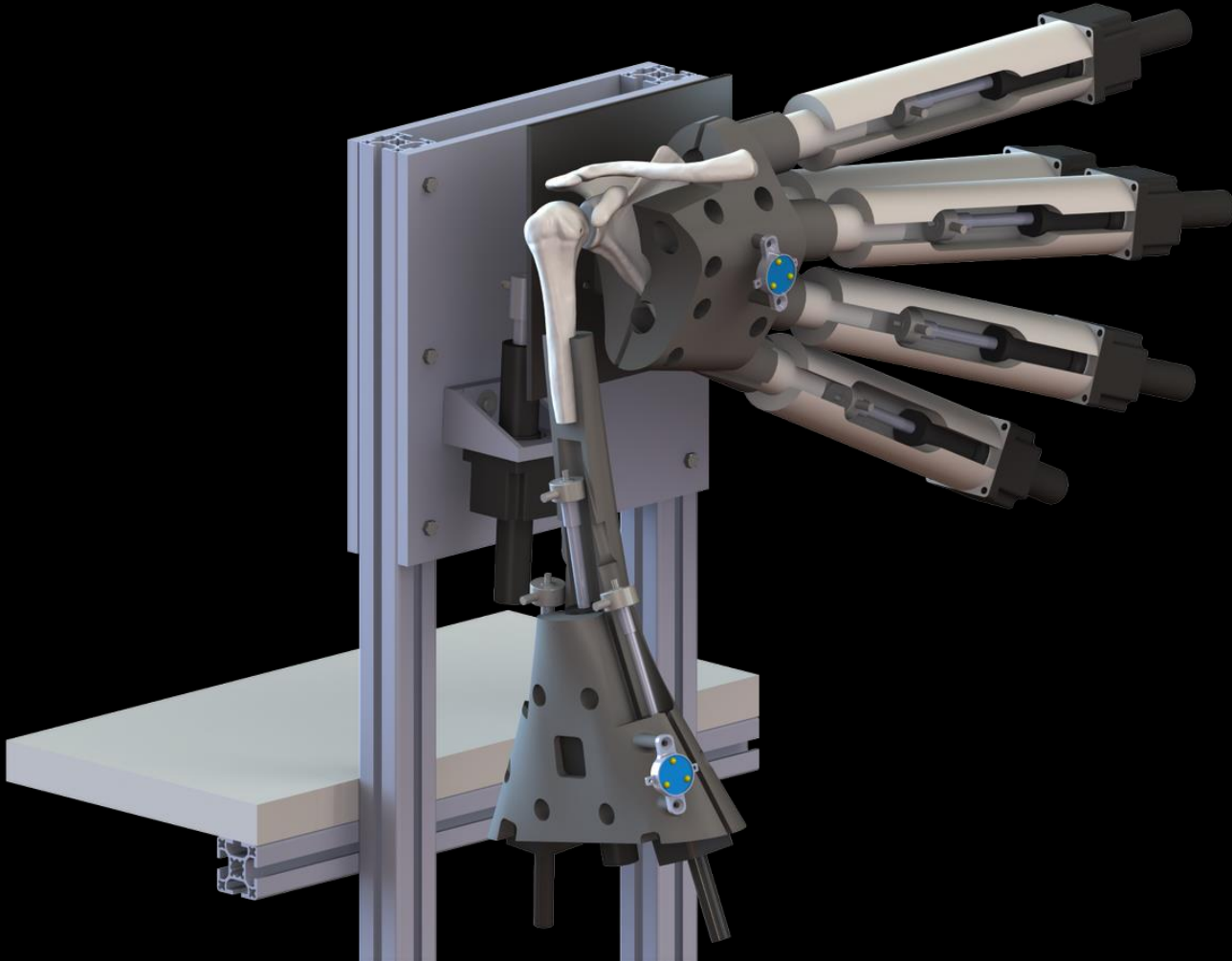![Macquarie University, Sydney Australia logo]

- [Hexapod Shoulder Simulator Animation](#)

FRONTIER

THE MAGAZINE OF MACQUARIE UNIVERSITY HOSPITAL | SPRING 2020

Evolution of the most advanced cadaveric shoulder simulator

MQ HEALTH RESEARCHERS HAVE SUCCESSFULLY CONDUCTED THE FIRST CADAVERIC PILOT TESTS – MADE POSSIBLE THROUGH A MULTI-PARTNER INTERNATIONAL COLLABORATION AND THE UNIVERSITY'S WORLD-CLASS CADAVERIC SURGICAL SKILLS CENTRE.

International satellite link overcomes Covid-19 obstacles for heart patients

The future of healthcare beckons

Weight loss patients access much-needed surgery

MACQUARIE UNIVERSITY Hospital

Research Assistant

- Conducted cadaver studies with surgical fellows

- Performed statistical analyses to compute repeated measures ANOVA and reliability measures

- 3D scanned patients to reverse engineer splints for chronic conditions

- 3D printed and post-processed splints for patients

- Interactive splint render

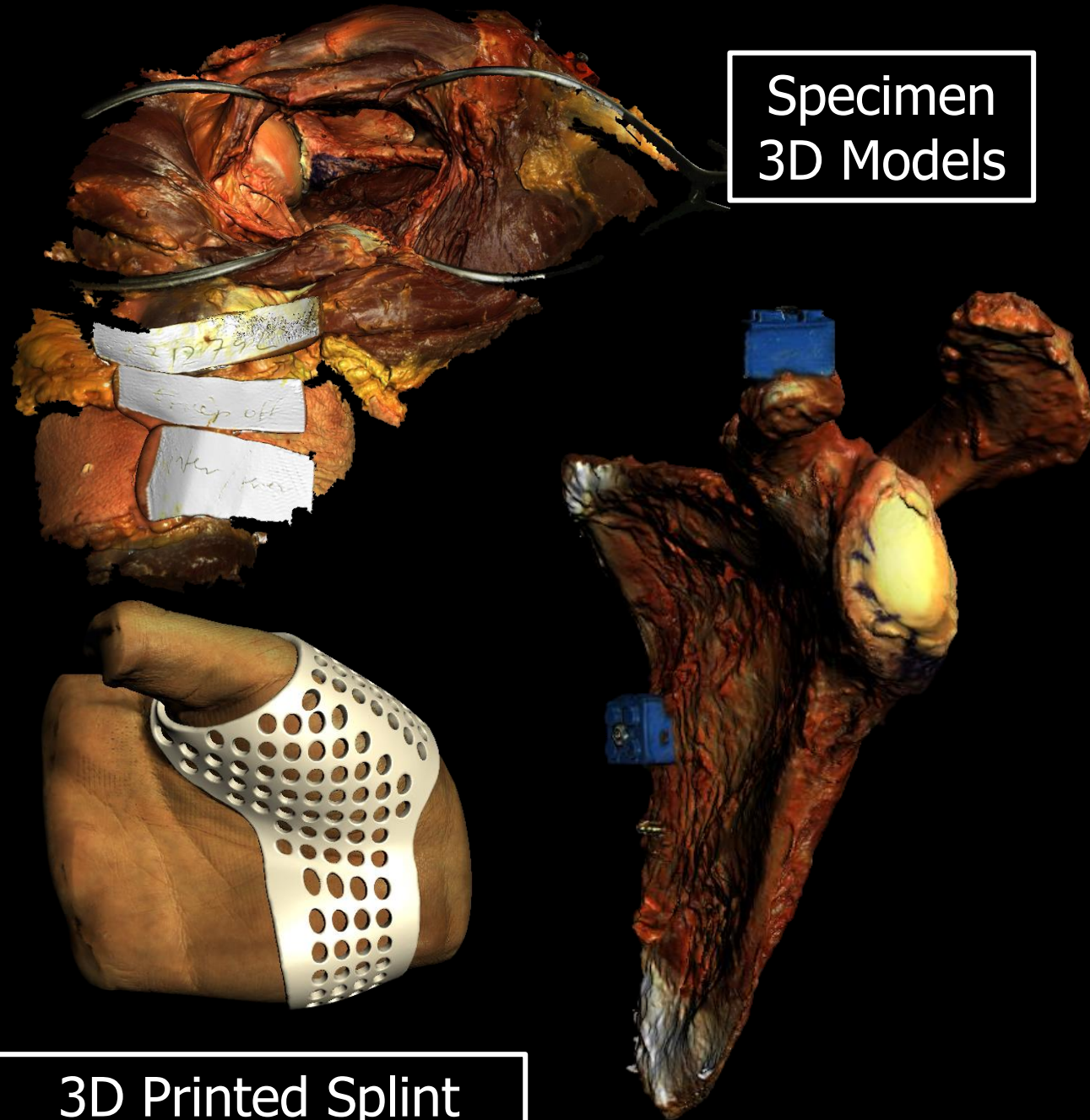**ROTH | McFARLANE**
HAND & UPPER LIMB CENTRE
ST. JOSEPH'S HEALTH CARE LONDON

ROTH | McFARLANE
HAND & UPPER LIMB CENTRE
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Specimen 3D Models
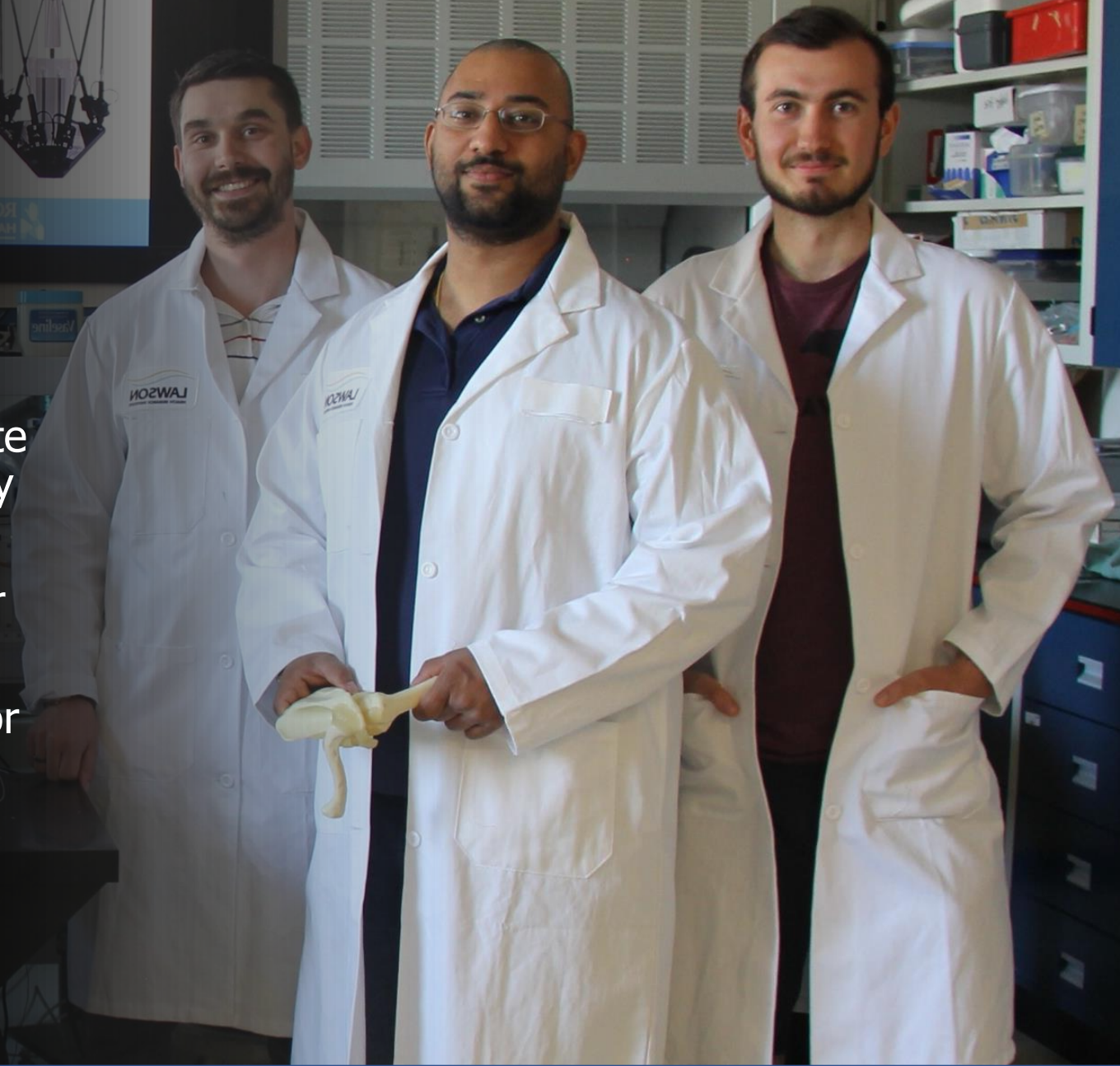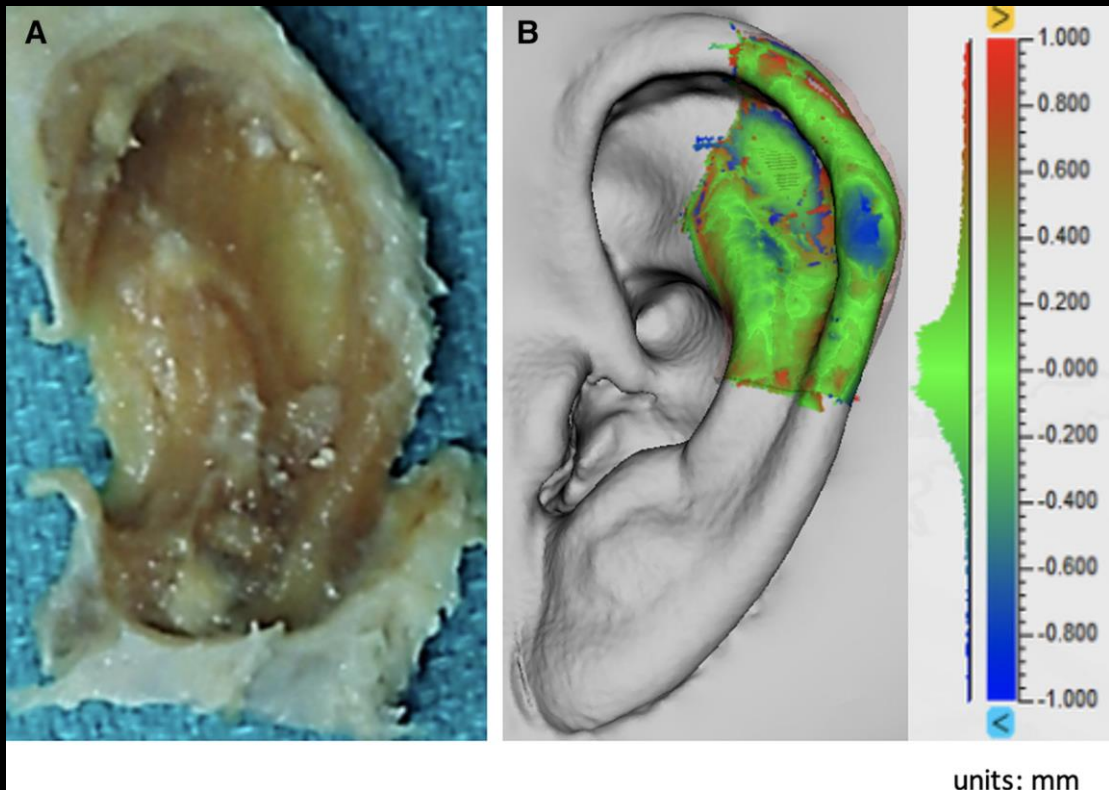
Robot Contouring for Ear Reconstruction

3D Printed Splint
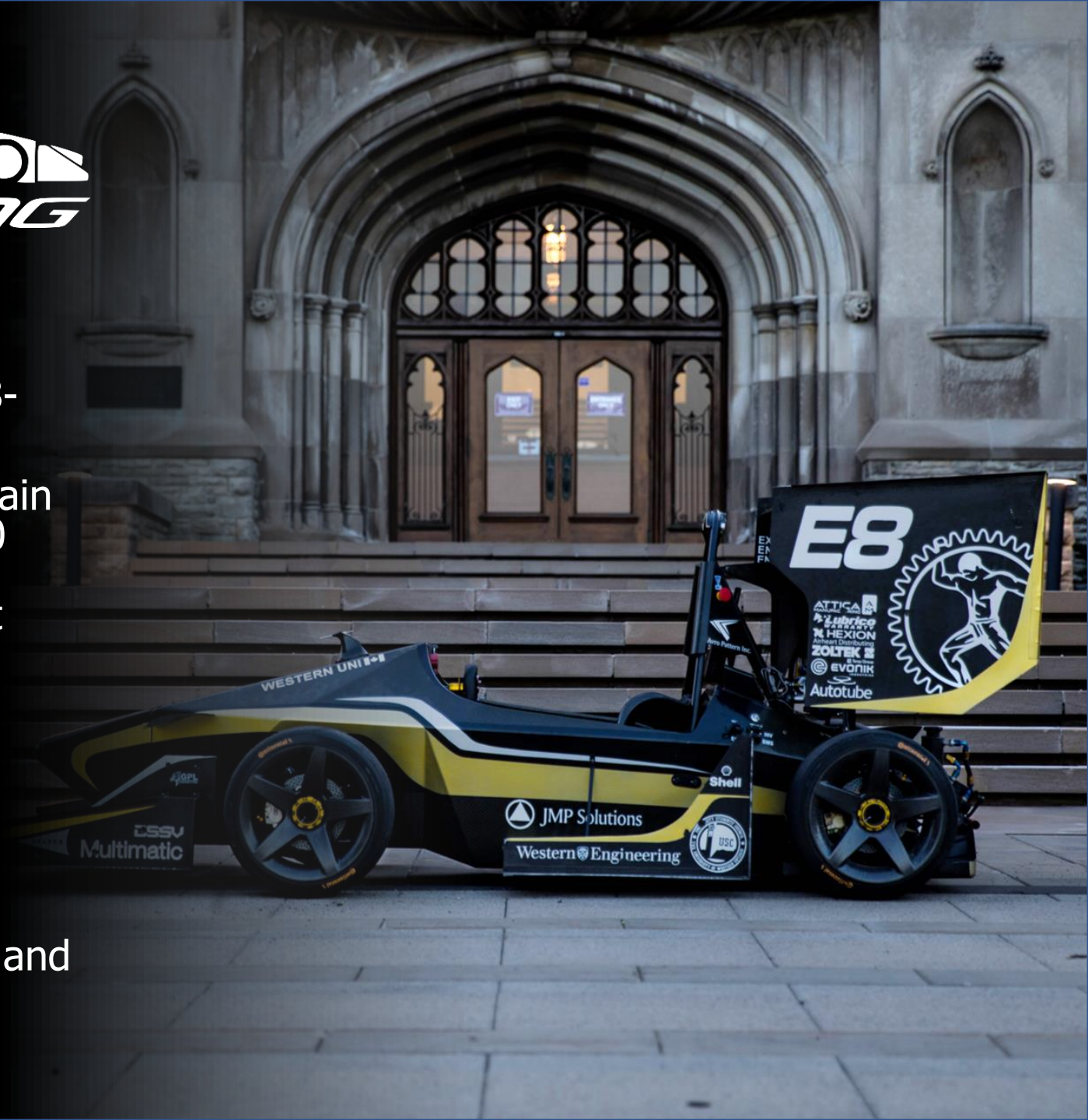
Western FORMULA RACING

Low Voltage Lead

- Designed low voltage systems for 2018-2019 and 2020-2021 seasons

- Final year project of electrified powertrain using an Emrax 228 motor, DTI HV-500 inverter, and 500 V Lithium-ion battery pack with custom battery management system

- Designed and manufactured wire harnesses with improvements in modularity, reliability, and design documentation

- Mentored junior team members

- Integrated sensors using CAN protocol and MoTeC M150 engine control unit

Western FORMULA RACING

Interactive Vehicle Render

Vehicle Diagram

Driver Inputs and Outputs
(Accelerator & Brake, Dashboard Display)

Vehicle Controller
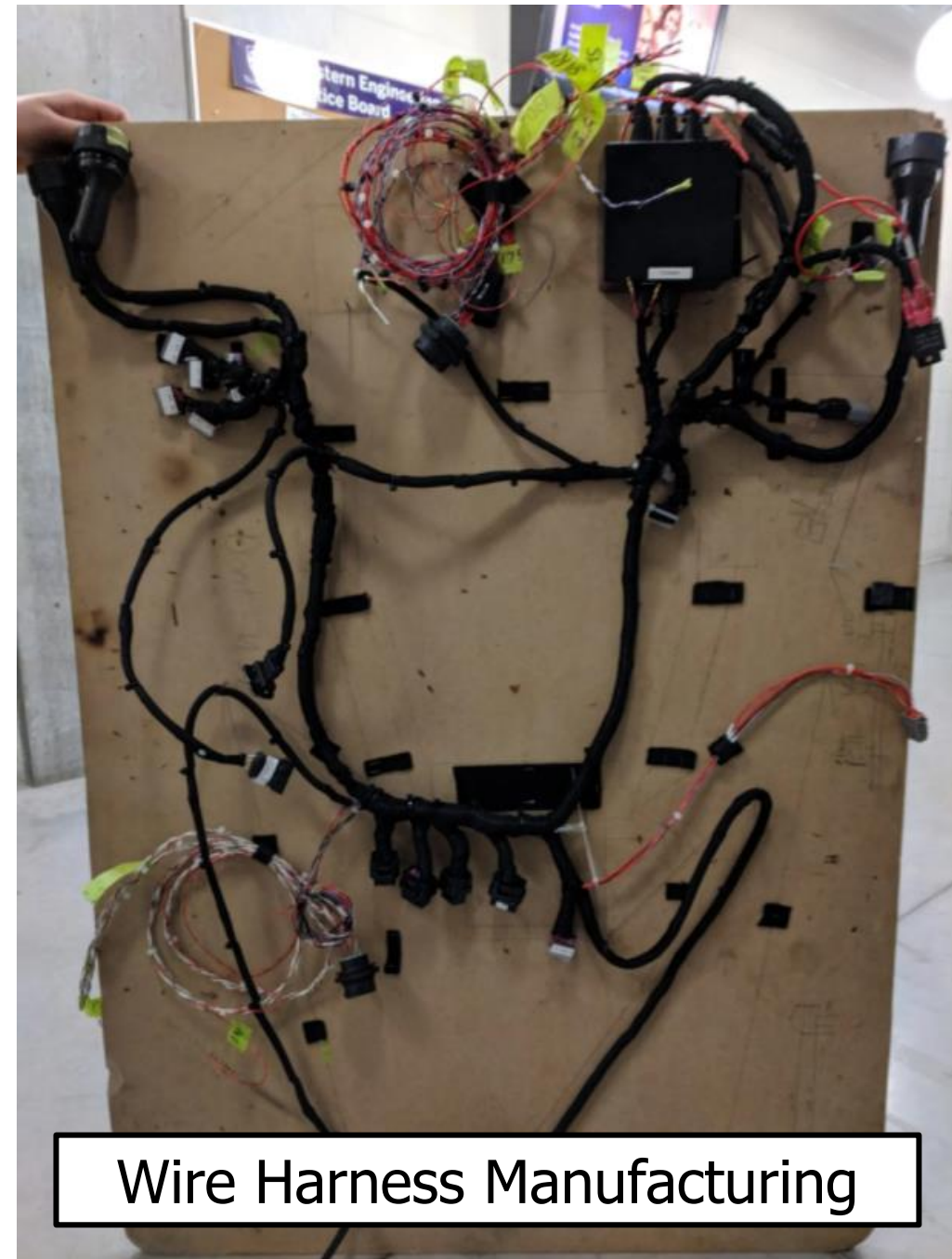*Motec M150*

Vehicle Sensors
(Wheel Speed, Temperature sensors, etc.)

CANBUS

CANBUS

WFR Designed Accumulator
504V

HV+ — 2AWG — DC+

HV- — 2AWG — Energy Meter — 2AWG — HV Disconnect — 2AWG — DC-

Motor Inverter
DTI HV-500
3-phase

U — 2AWG
V — 2AWG
W — 2AWG

MOTOR
EMRAX 228MV

13-Bit Encoder

Accumulator Diagram

Cell Supervisor — SEG6
Cell Supervisor — SEG5
Cell Supervisor — SEG4
Cell Supervisor — SEG3
Cell Supervisor — SEG2
Cell Supervisor — SEG1

Temperature and Voltage Taps

AIR+

2AWG

16AWG

16AWG

Molex MF

Molex MF

Precharge

PCB

2AWG

16AWG

HVC: HV+_DRY
Amphenol SLP

Molex MF

2A

1A

1A

Discharge

15K

Molex MF

HV_AUX: TSMP+
TE 796271-1/796272-1

1A

16AWG

HV_AUX: EM+
TE 796271-1/796272-1

DCDC

IMD

HVIB

Molex MF

Molex MF

Molex MF

16AWG

Molex MF

1A

16AWG

HV_AUX: HV-_DRY_AUX
TE 796271-1/796272-1

Molex MF

PCB

15K

Molex MF

HV_AUX: TSMP-
TE 796271-1/796272-1

2AWG

Hall Sensor

150A

2AWG

16AWG

Molex MF

AIR-

2AWG

HVC: HV-_DRY
Amphenol SLP
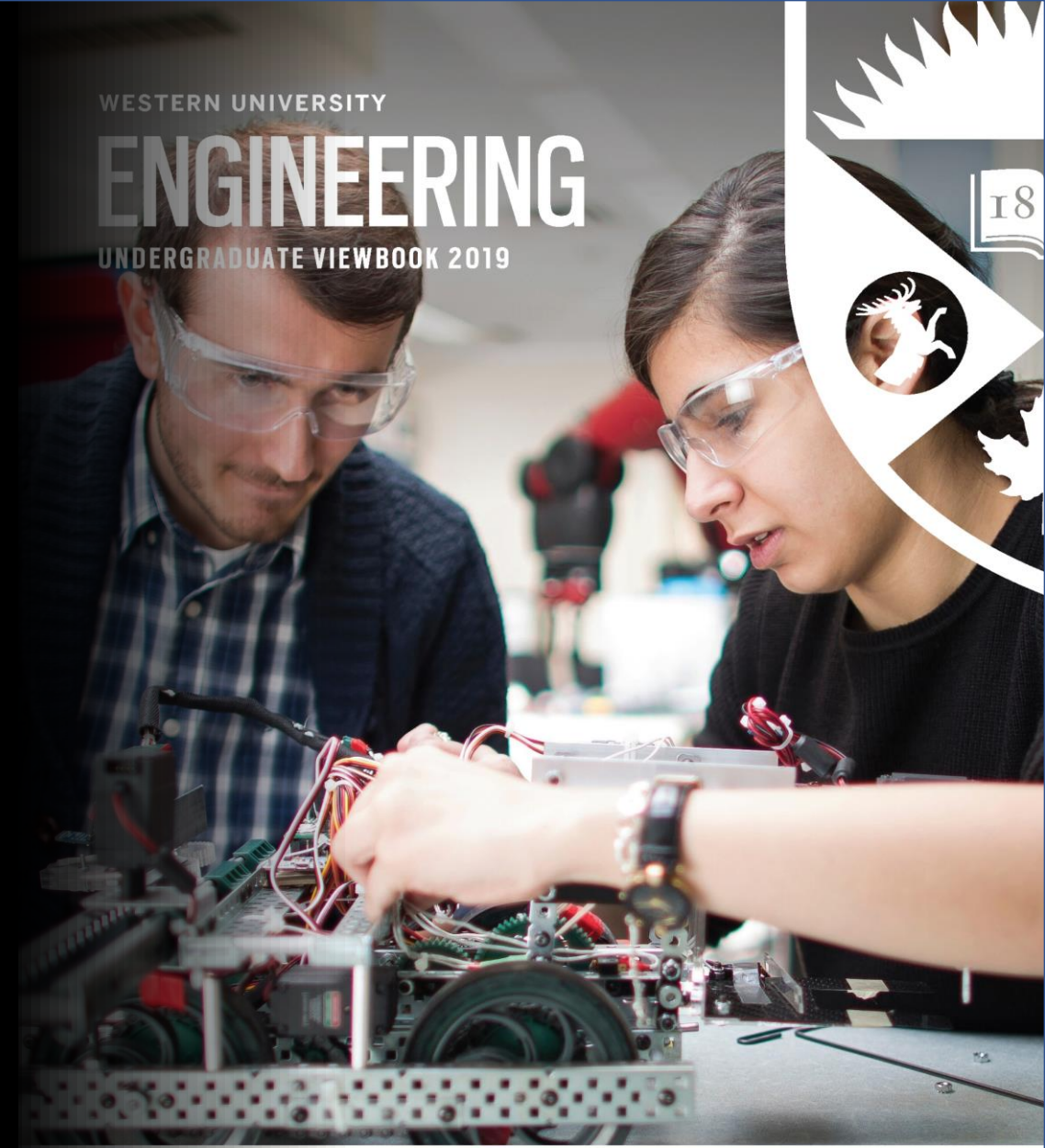
AMS Master — Analog Voltage / I2C

Wire Harness Design

Wire Harness Manufacturing

- BESc. Mechatronic Systems
- Dean's Honour Roll
- Certificate of Leadership and Innovation
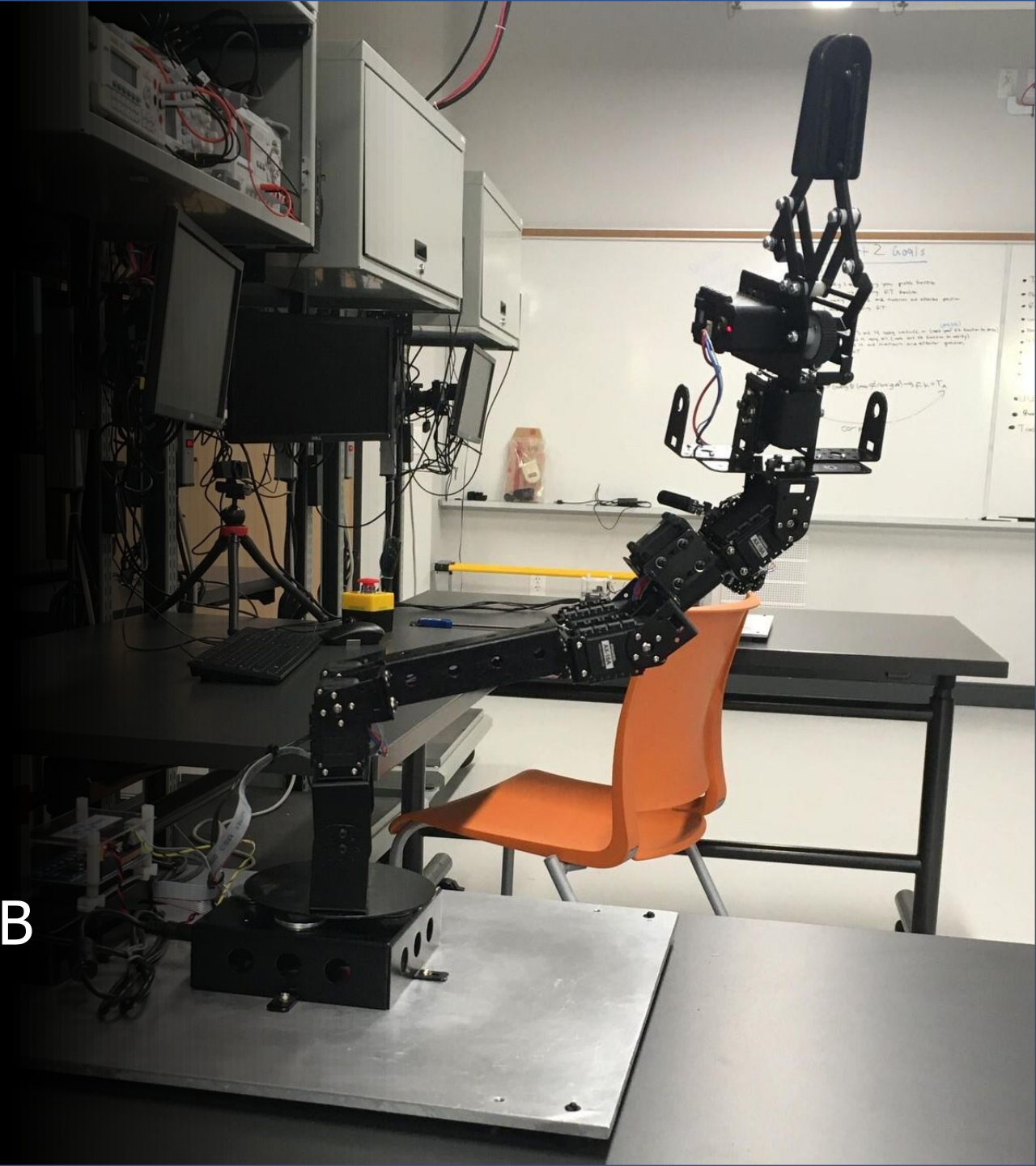
Robotic Manipulators

- Serial manipulator kinematics and dynamics

- Path planning with via points, attractive fields, and repulsive fields

- Implemented gradient descent algorithm and control in MATLAB

Technical Skills

Computer-Aided Design

- SolidWorks
- Artec Studio
- Geomagic Wrap
- Autodesk EAGLE

Programming

- MATLAB
- LabVIEW
- Python
- Simulink

Prototyping

- Arduino
- Soldering
- 3D Printing
- 3D Scanning
- Wire Harness Construction

Biomechanics and Medical Imaging

- Materialise Mimics
- Optotrak Certus
- The MotionMonitor

Creative Design

- Microsoft Office
- Photoshop
- PhotoView 360
- Keyshot
- LaTeX

Personal Projects
LED Cube

- Serial Peripheral Interface (SPI)

- Daisy-chained 74HC595 shift registers to control 8x8x8 cube of LEDs

- [YouTube Video](#)