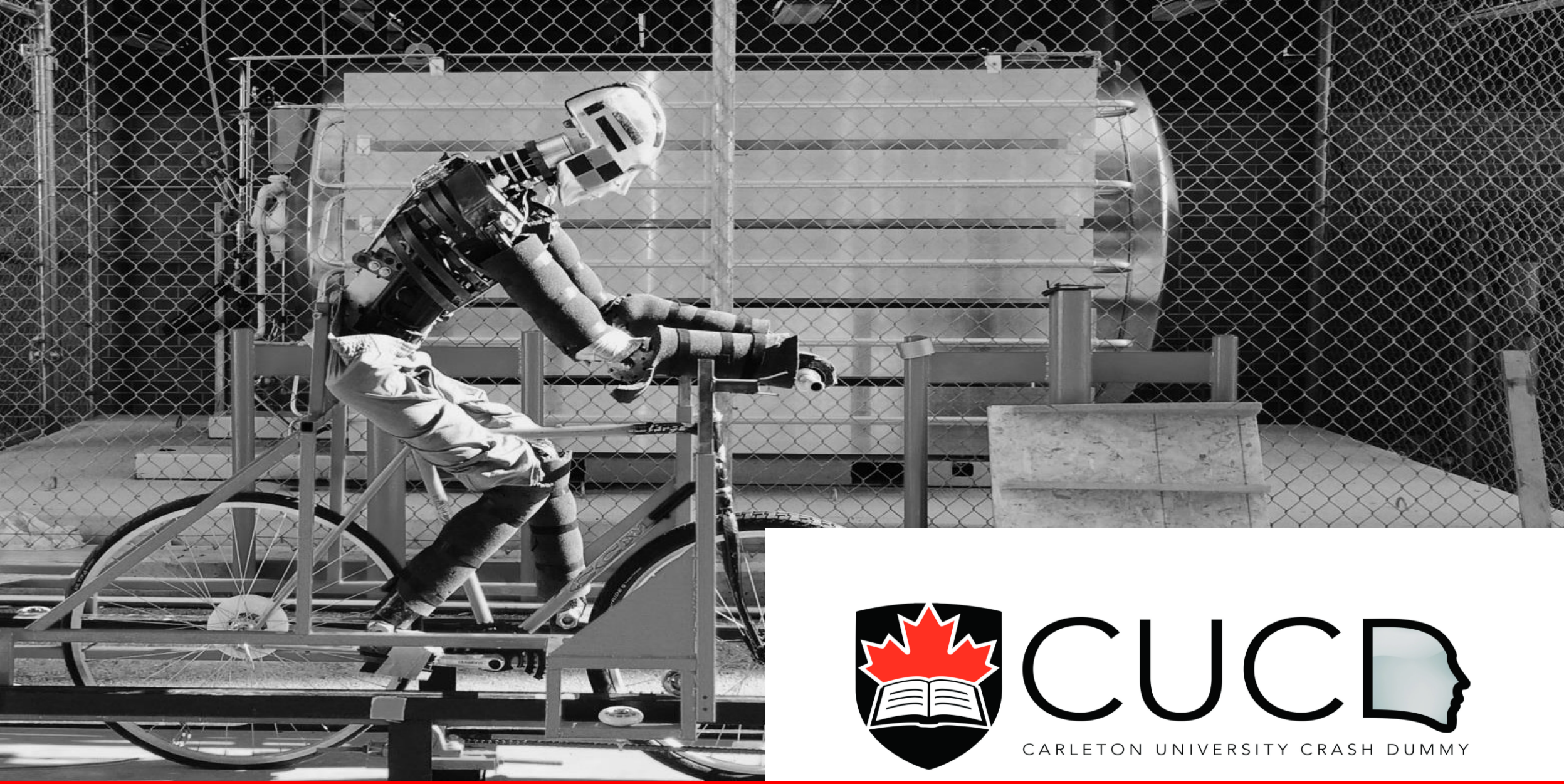

CUCD

CARLETON UNIVERSITY CRASH DUMMY

Amanda Graf & James Gubbels

Biomedical and/or Mechanical Engineering

Project Background

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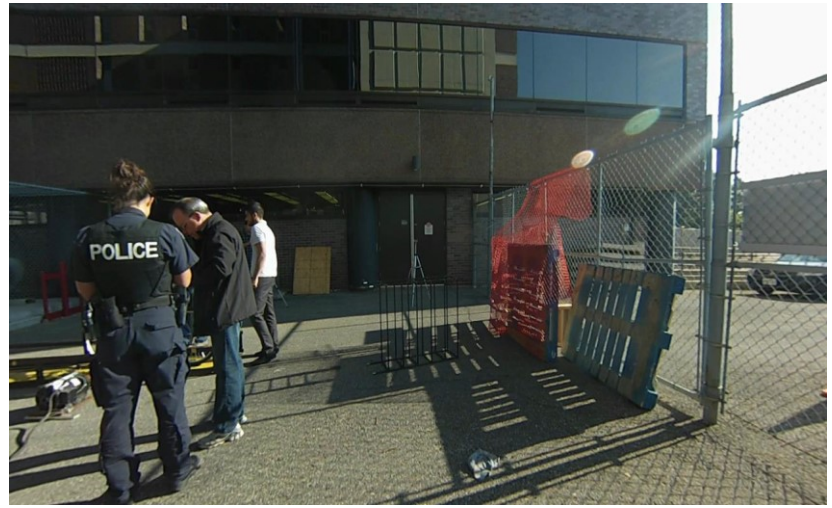
- Established in 2012
- Approximately 25 Biomedical and Mechanical Engineering Students
- Design and fabrication of a crash dummy, launch system, and data collection system
- Collision configurations include cyclist hit from side, car hit from side, rear ending
- Data used by Ottawa Police for collision reconstruction and training purposes.



Above: Ottawa Police review the launch system before the October 2016 crash test. Below: Ottawa Police investigate a near-fatal crash in August 2014.

Project Teams

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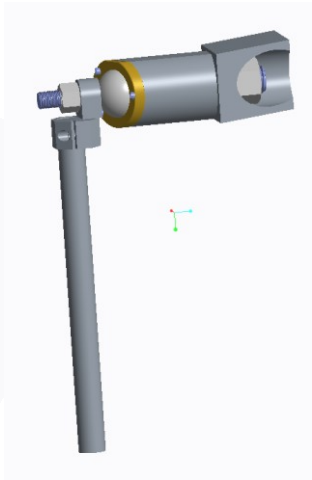
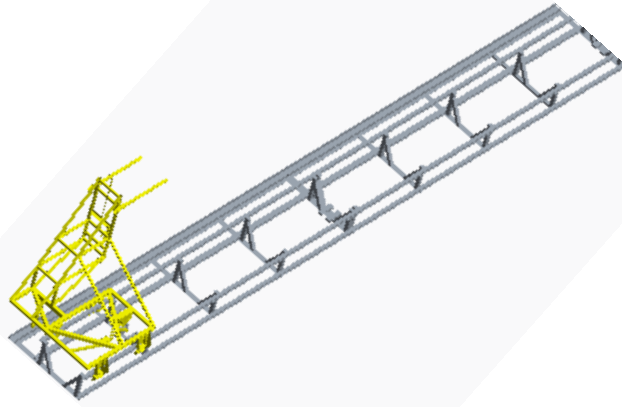
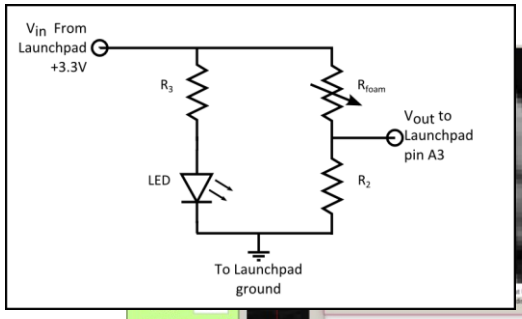
Crash Dummy

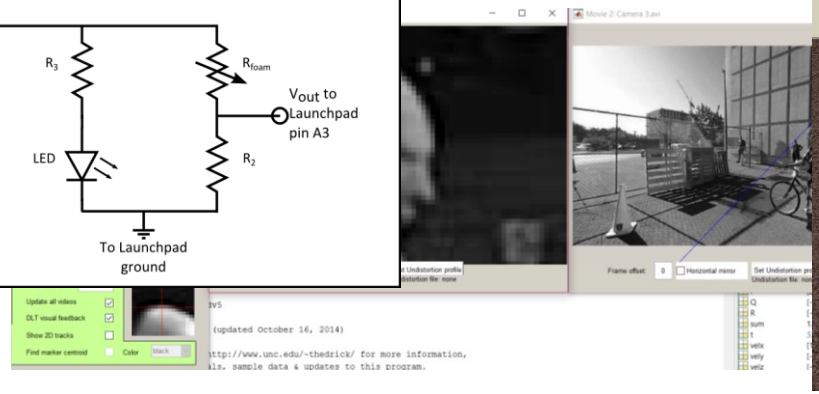


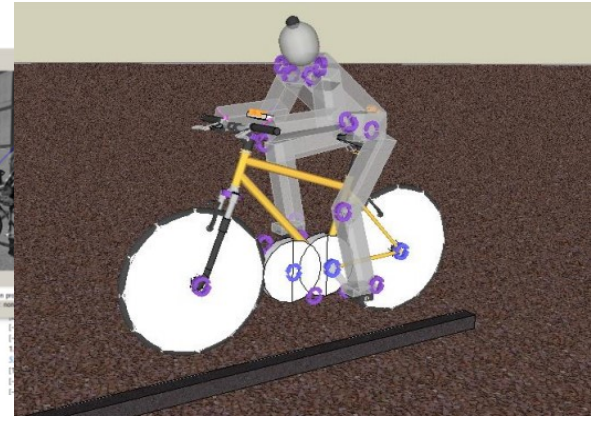
Launch System



Sensing and Simulation







Crash Dummy Team – 2016/2017 Goals

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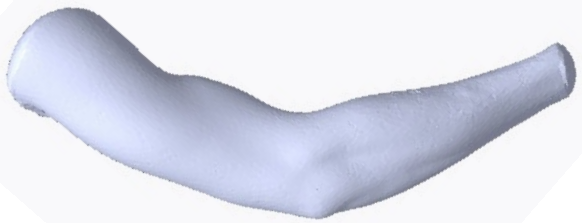
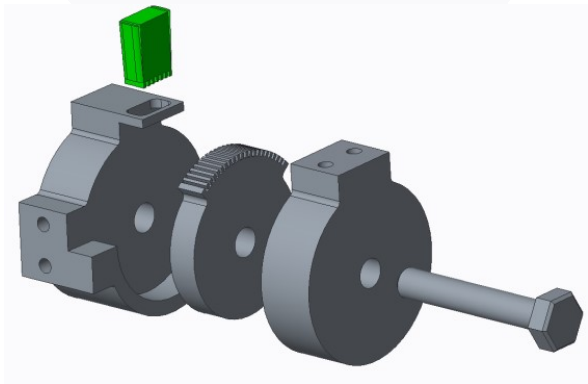
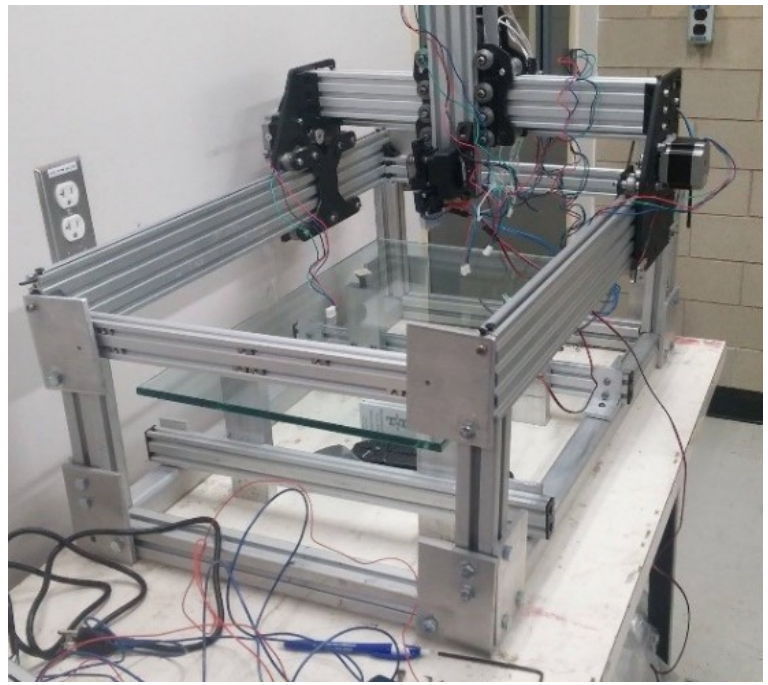
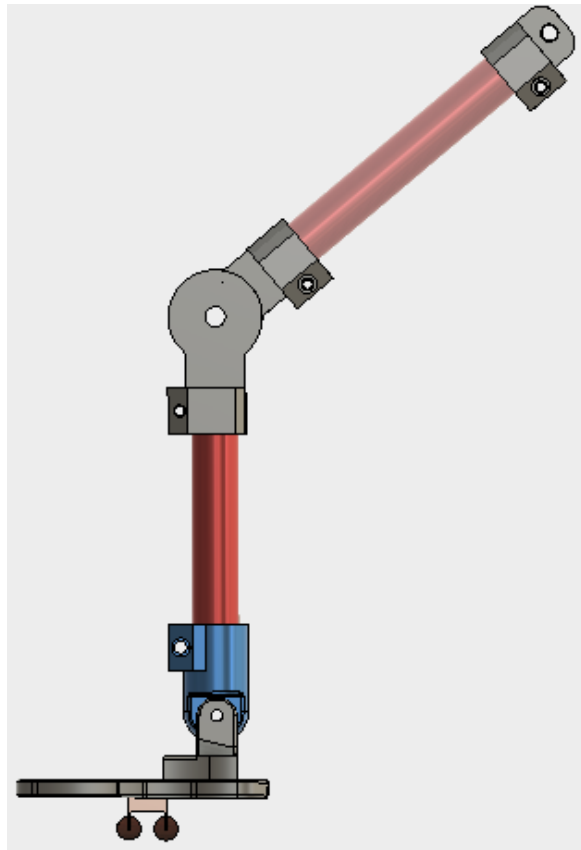
- Development of a modular crash dummy
  - 2016/2017 Dummy: 50th percentile 19 year old male
- Large format 3D Printer
  - Large format to print dummy skin from flexible material









Images L-R: 3D scan of dummy model arm, elbow joint assembly, 3D printer assembly and leg assembly.

Launch System Team – 2016/2017 Goals

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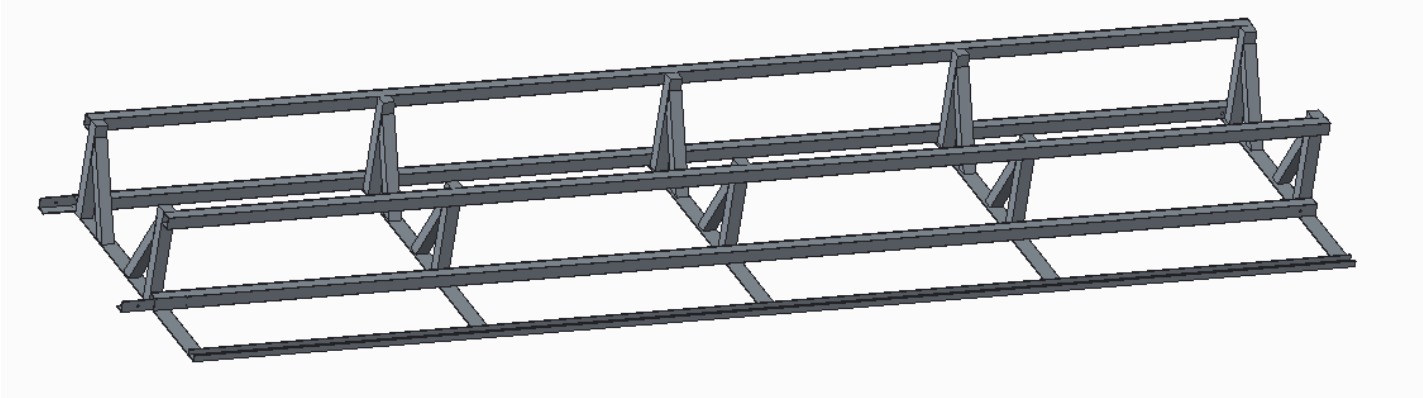
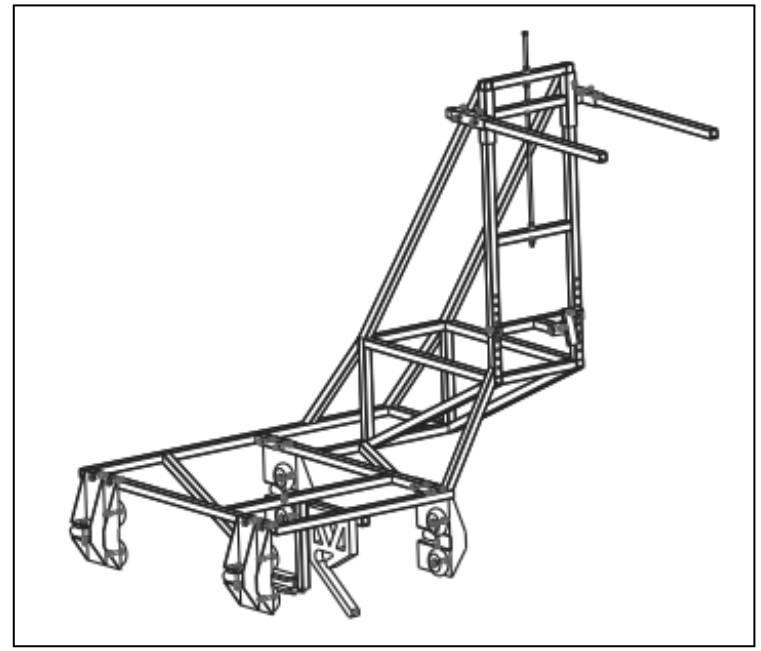
- New launch track and cart system
  - Improved stability and reliability
  - Bike outside of track

- Launch timing system upgrades
  - Use of both ultrasonic and laser sensor
  - Updated launch software





Images L-R: New track design, sensor rig, cart assembly.

Sensing and Simulation– 2016/2017 Goals

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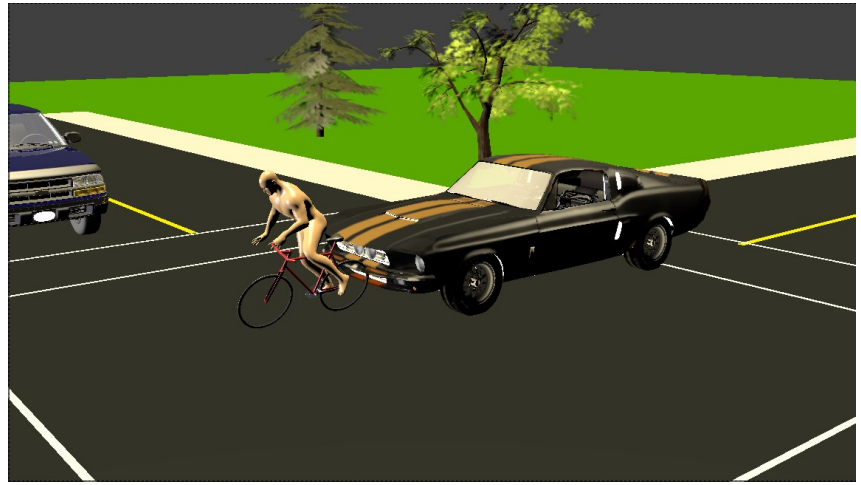
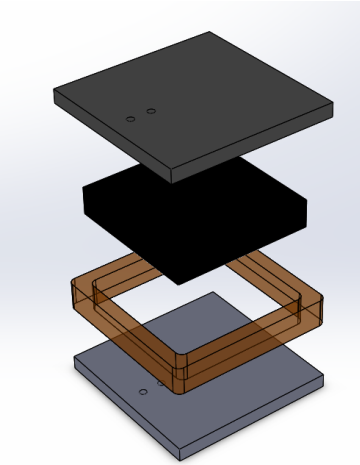
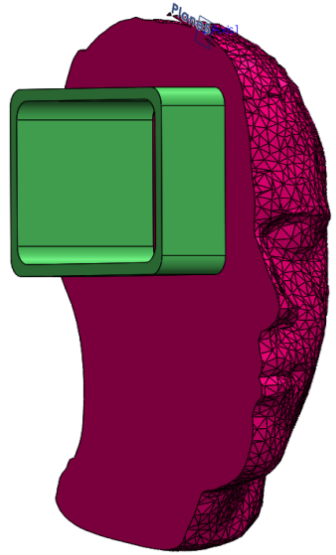
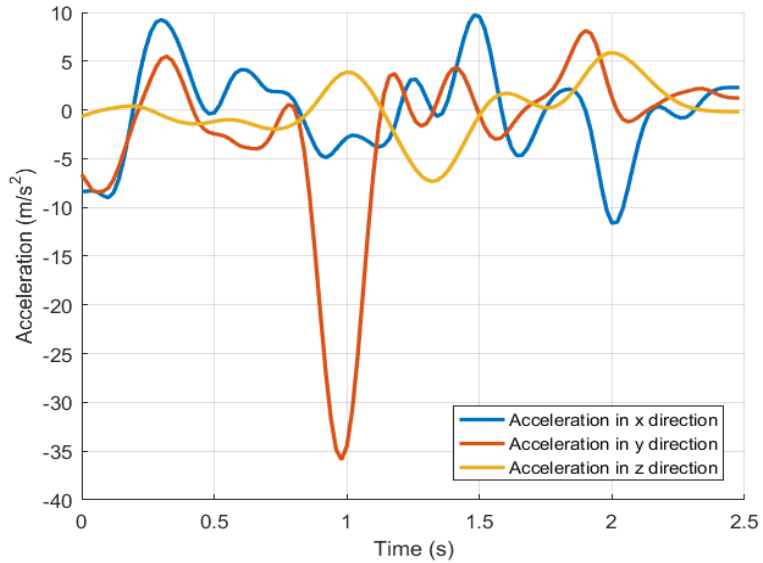
- Sensing system simplification
  - Fewer sensors, centralized within the dummy head for improved fidelity
- 3D Video Capture and Simulation
  - Higher frame-rate captures and automated simulation system using Blender









Images L-R: Impact sensor design, sensor compartment in head, 3D simulation, 3D video data analysis (acceleration of dummy head during October 2016 test).

2016 Final Crash Test

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April 1, 2016: Side impact collision test. Minor time delay results in ~50% collision on driver's side of car.

Goals for the Future

- Further development of 3D printer and skin
- Creation of more limbs for dummy modulation
- Launch system upgrades for reliability & braking
- Improved video resolution for data collection
- User-friendly interface for crash simulations

October 7, 2016: First test demo for 2016/2017 teams.

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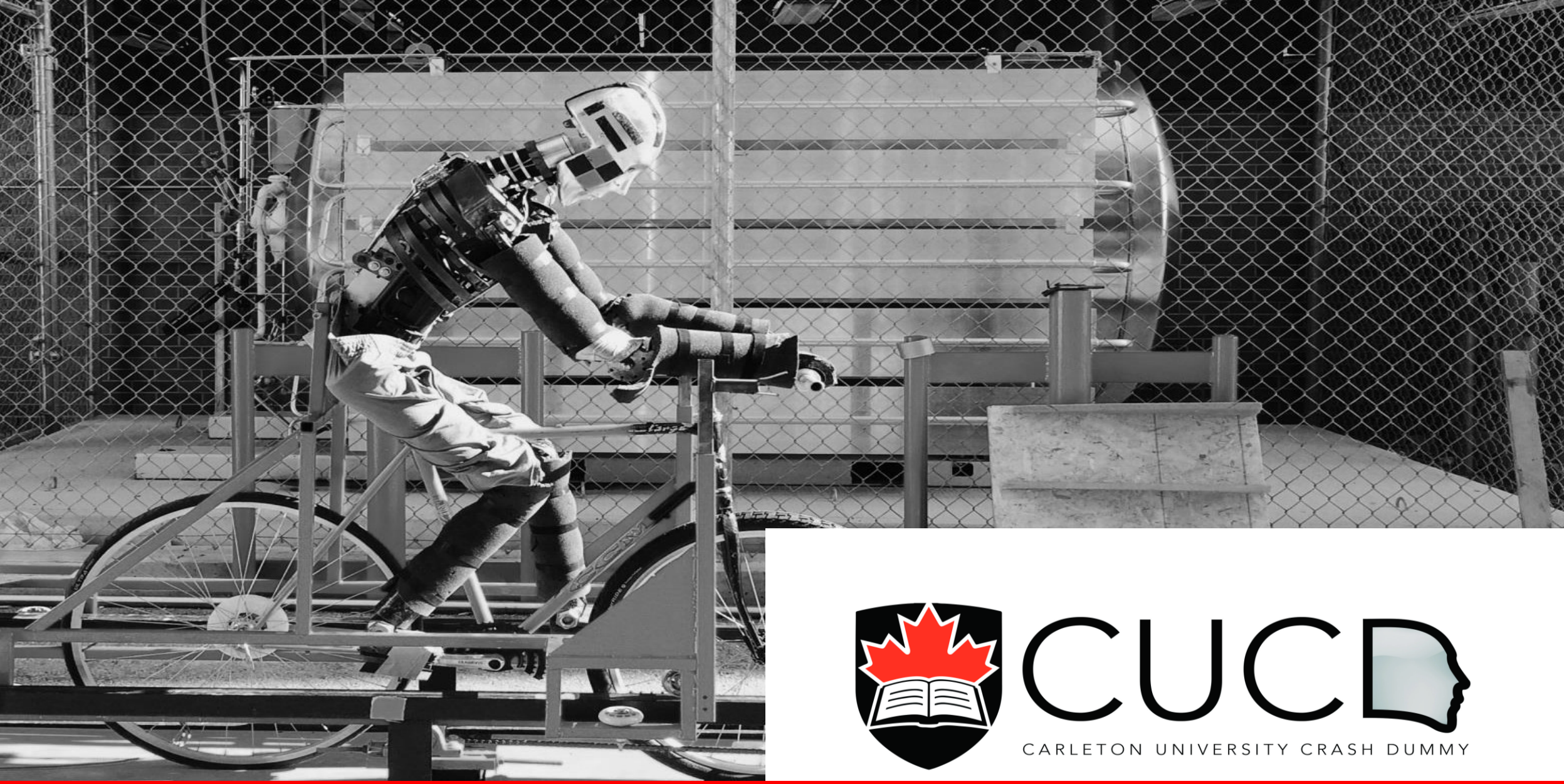

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