

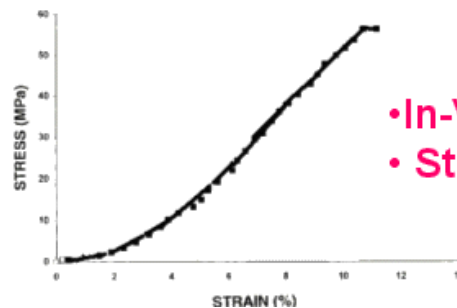
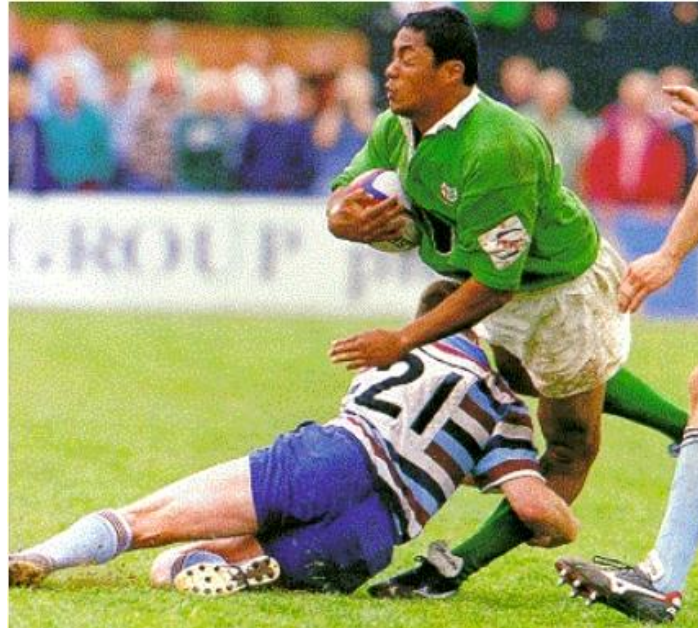
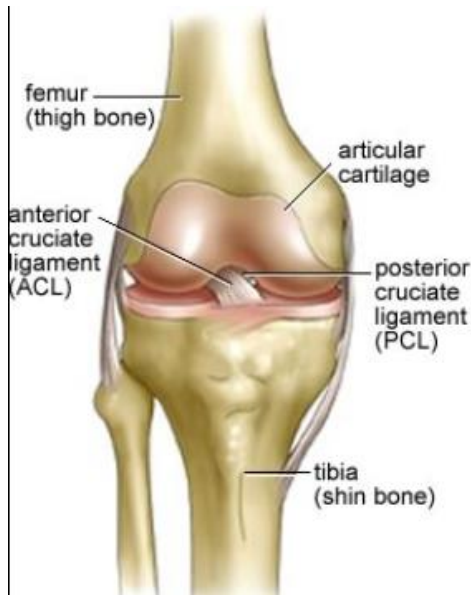
Solid Mechanics Research

- Prof. N. Chandrashekar (Biomechanics)
- Prof. D. Cronin (Impact Biomechanics, Pipeline integrity)
- Prof. G. Glinka (Fatigue/Fracture)
- Prof. K. Inal (Forming/Plasticity)
- Prof. H. Jahed (Fatigue/Plasticity)
- Prof. HJ Kwon (Constitutive Modeling/Biomaterials)
- Prof. S. Lambert (Design)
- Prof. J. Medley (Biomechanics, Tribology)
- Prof. A. Salehian (Vibrations, Smart Materials)
- Prof. P. Sullivan (Composites, Manufacturing)
- Prof. M. Worswick (Forming and Impact)

Biomechanics of Knee Injury



Professor N. Chandrashekar



- In-Vitro simulation of knee injuries
- Structural properties of human tissues.

Impact Biomechanics

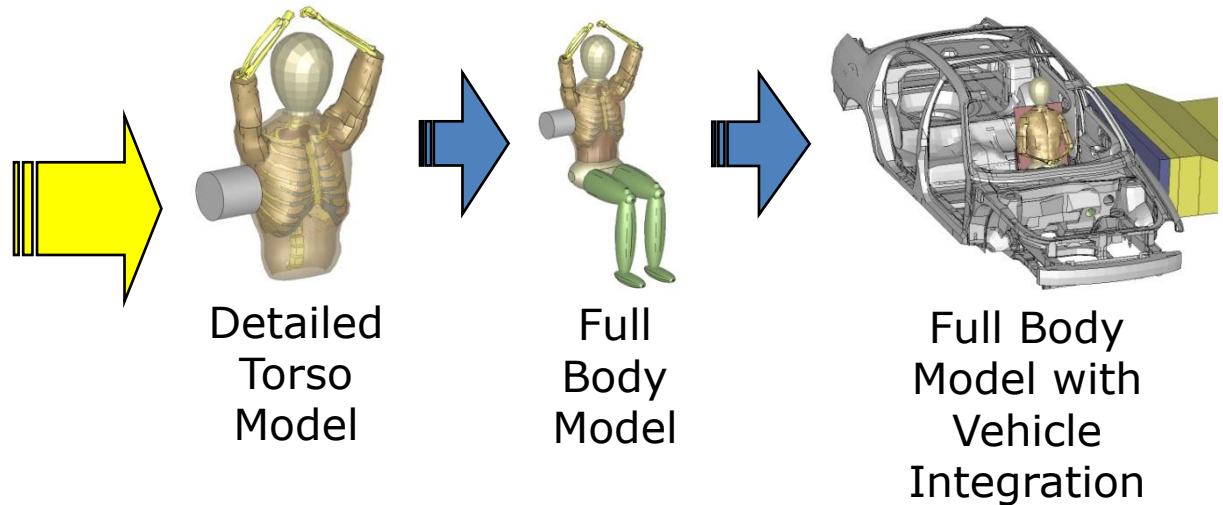


Professor D. Cronin

- The goal of impact biomechanics research is to protect the human body from 'serious' injury or trauma (anatomical rearrangement).
- The development and design of improved safety requires the 'test that cannot be done...'



Hybrid III Family

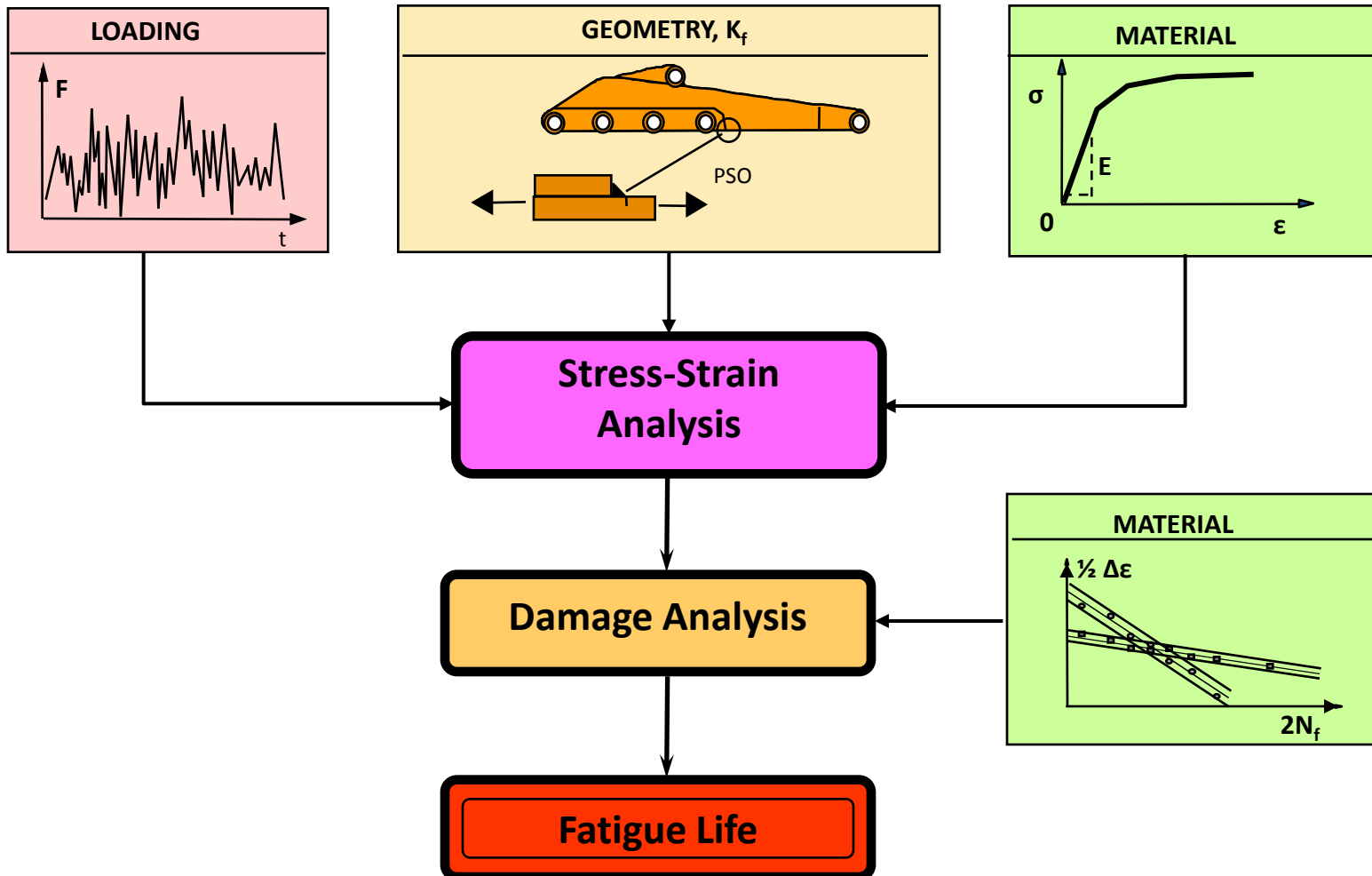


Fatigue & Fracture Mechanics

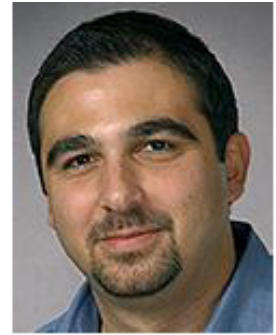


Professor G. Glinka

Information path for fatigue life estimation based on the ϵ -N method

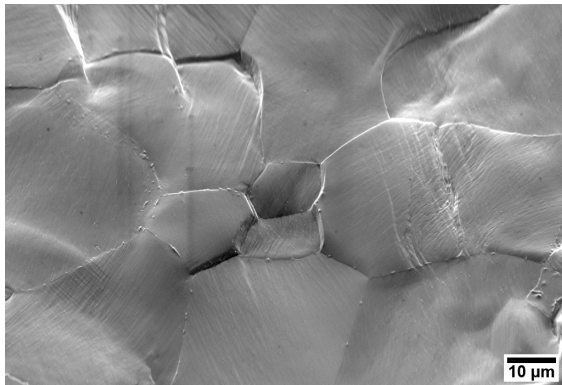


Crystal Plasticity & Forming

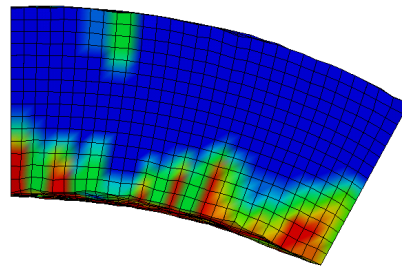
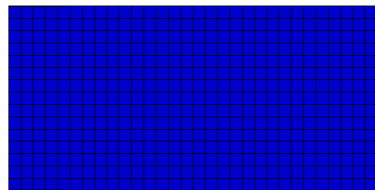


Professor K. Inal

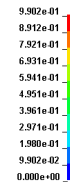
Micromechanics, Crystal Plasticity



High Performance Computing – Parallel Computing



Metal Formability



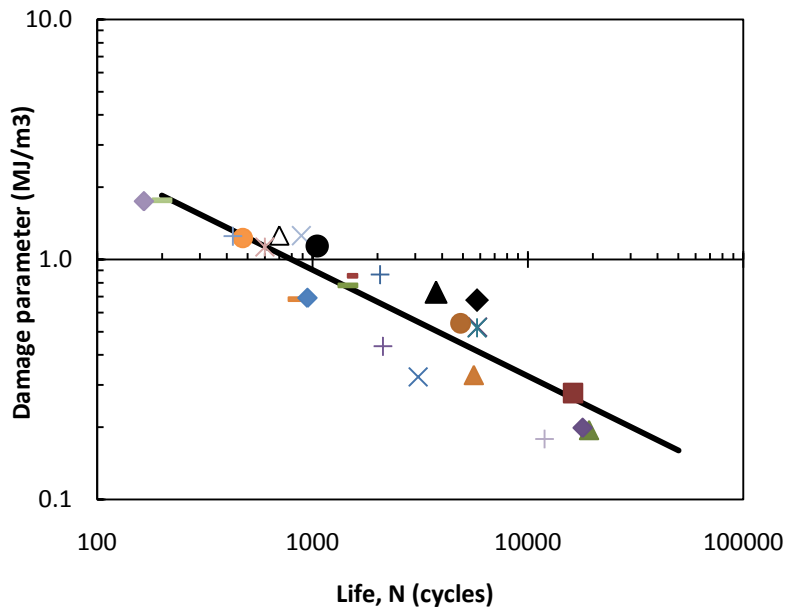
Fatigue & Stress Analysis Laboratory

Toward the lightest Body in White



Professor H. Jahed

- Mg and other lightweight metal
- Fatigue characterization & modeling
- Cyclic plasticity modeling

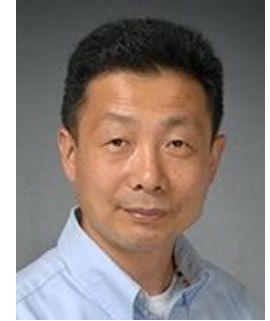


Front end mass of a mid-size car:

70 kg	Steel
46 kg	Al
30 kg	Mg

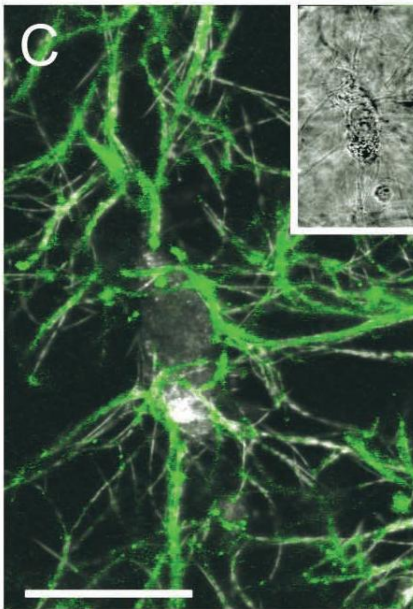


Biomechanics and Gel mechanics



We are developing ...

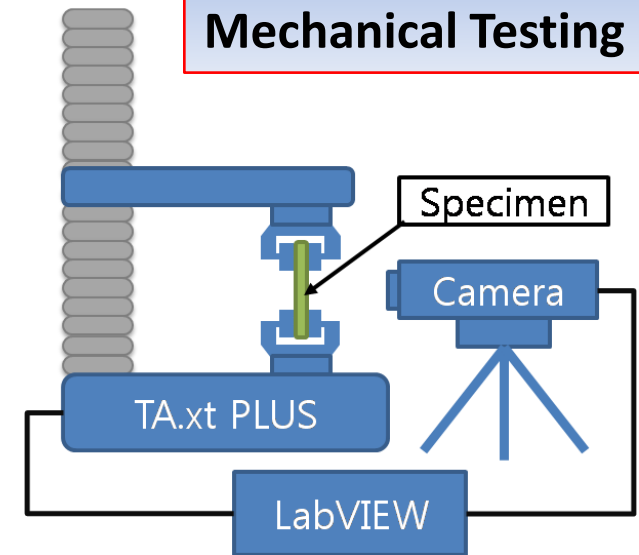
Artificial Tissues



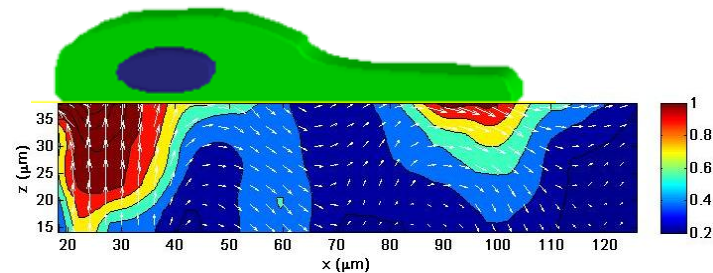
Gel for Drug Delivery



Nonconventional Mechanical Testing



Cell Traction Force Measurement



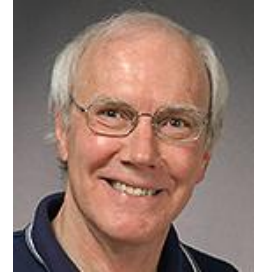
Design & Fatigue and Fracture



Professor S. Lambert

- **Automotive Design**
- **Design Education**
- **Fatigue and Fracture**

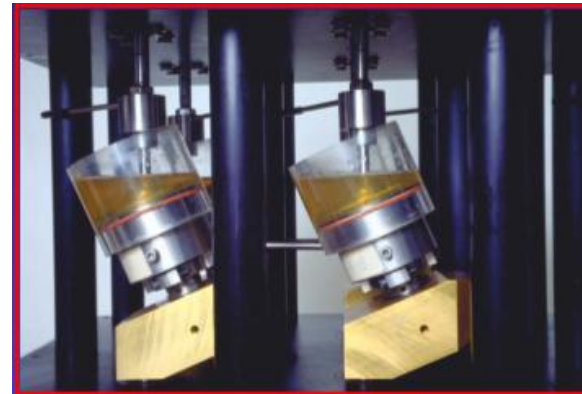
Biomechanics & Tribology



Professor J. Medley

- **Simulator Wear of Hip Implants**

- **Hip Simulator**



Individual Channels

Test
Specimens



Vibration & control of inflatable satellite systems



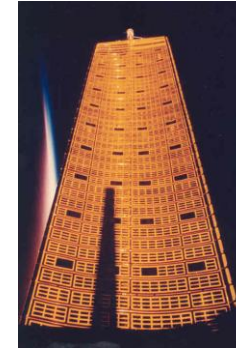
Professor A. Salehian

- Thermally induced vibration of inflatable space structures upon passing the eclipse line
- Modeling gossamer membrane : dynamic behavior, designing vibration controller

sunlight



shade



Energy harvesting using smart materials



Power harvesting using piezoelectric material for low power electronic devices



Inflation chamber



Composite Materials & Polymer modeling



Professor P. Sullivan

- Experimental Characterization and Modeling of Thin-walled Plastic Components

1. Moisture Diffusion

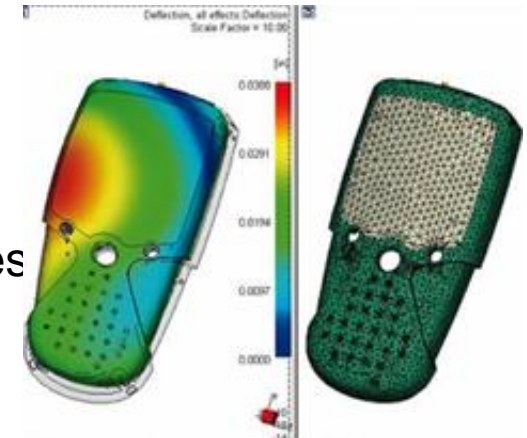
- Due to exposure to humid environments
- Causes swelling of the material
- Changes thermophysical and mechanical properties

2. Physical Aging

- Structural molecular relaxation/rearrangement
- Changes thermophysical and mechanical properties

- Two MASc positions in Fall 2010

- Hygrothermal degradation of electronic adhesives (RIM)
- High temperature degradation in automotive fluid environments (DANA)



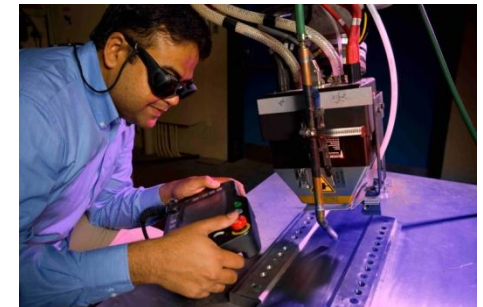
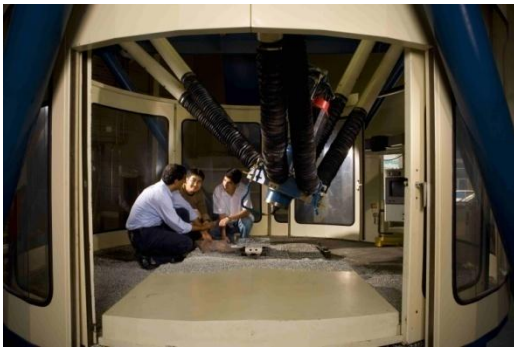
Forming & Automotive research

Research to create THE CAR OF THE FUTURE



Professor M. Worswick

- Metal Forming / Crashworthiness
- Damage Mechanics

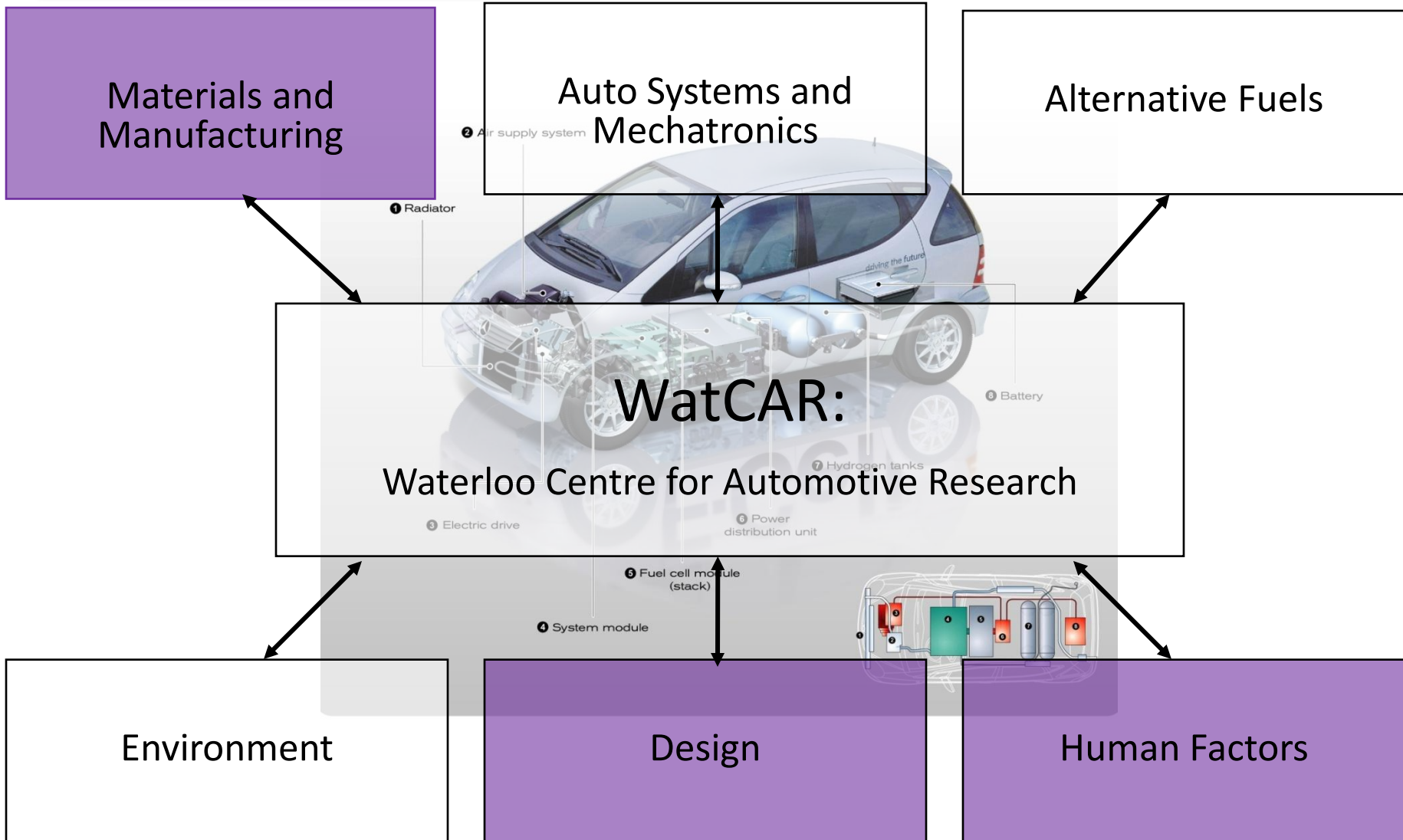


*WatCAR- Waterloo Centre for
Automotive Research*

IAMI



WatCAR



56 professors, 20 research engineers and technicians, 200+ grad students