



# CASE WESTERN RESERVE UNIVERSITY

## CASE SCHOOL OF ENGINEERING

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### RESEARCH AREAS AND APPLICATIONS

**Mechatronics: design and control of intelligent electromechanical and robotic systems**

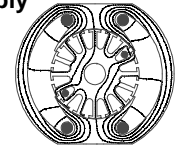
- applications to:
  - agile manufacturing and mechanical assembly
  - rapid prototyping
  - reflexive, adaptive and learning systems
  - biomedical applications in orthotics, prosthetics and radiation oncology

### APPROACH

- Collaborative, interdisciplinary design projects invoking skills in system modelling, analysis, and synthesis of creative solutions, typically exploiting real-time computer controls
- Depth of experience in force feedback for robotic assembly
- Biological inspiration for reflex and learning control

### COLLABORATIONS

- The Cleveland Clinic (radiation oncology)
- Ford Motor Co. (force-guided robotic assembly)
- Dynamotors, Inc. (novel motor design and control)
- Geauga Rehabilitation Engineering (mechatronic orthotics)
- CWRU Depts of Biology, Mechanical Eng (agile manufacturing; learning and intelligent systems)
- CWRU Dept of Materials Science (rapid prototyping)



Dynamotor: experimental drive with rotating electronics

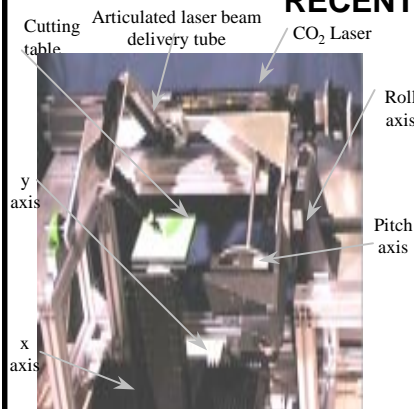


Mechatronic design for orthotic knee brace

### RESEARCH SPONSORS

- NSF, Dynamotors, Inc., Ford Motor Co., CAM-LEM, Inc., Sandia National Labs, The Cleveland Clinic, CAMP, CAISR, National Institute of Standards and Technology

### RECENT ACCOMPLISHMENTS



Prototype 4-axis laser-cutting platform for solid freeform fabrication achieved faster, more accurate cutting for SFF

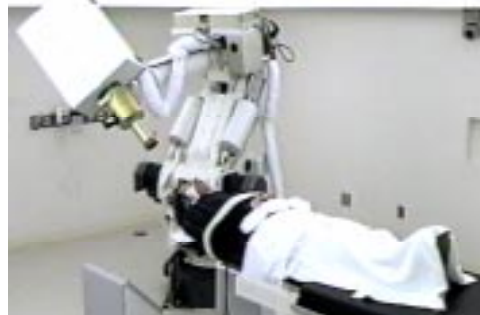


Image-Directed Radiation Oncology system at The Cleveland Clinic: successfully demonstrated value of robotically-assisted cancer treatment



ParaDex prototype closed-chain manipulator being investigated for force-guided mechanical assembly



Vertical cut vs. tangent cut 3-D objects fabricated by CAM-LEM solid freeform fabrication system