

## Overview of the Robotics and Energetic Systems Group



### Robotics and Energetic Systems Group

**Purpose:** Since the early days of the Atomic Energy Agency when scientists at Oak Ridge National Laboratory (ORNL) developed servomanipulators to protect radiation workers from radioactive materials, ORNL robotics engineers have been creating unique technologies to meet the needs of workers, the public, and society as a whole, including sensor-based navigation systems, advanced mobility systems, human-machine synergistic systems, and novel power and actuator technologies.

**Sponsors:** U.S. government agencies such as the Department of Energy and the Department of Defense, university partners, and private companies and organizations.

- Group Members:**
- Francois Pin (Leader)
  - Karen S. Harber (Admin. Support)
  - John Jansen
  - Randy Lind
  - Peter Lloyd
  - Lonnie Love
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The Robotics and Energetic Systems (RES) Group's capabilities and interests range from basic research—with fundamental development in motion planning, reasoning methodology, and advanced controls—to one-of-a-kind integrated system design, development, testing, and evaluation. Major areas of research and development include sensor-based robotics (including mobile robots, advanced manipulators, and combined mobility manipulation systems), human-amplifying machines (including technologies for exoskeletons, human-assist systems, strength-amplifying machines, and prosthetics), power transfer devices (actuation technologies), and energy-transformation systems (mostly for portable energy supplies). Areas in

which the group has developed exceptional capabilities include fluidics actuation and controls, both for high-precision and high-payload (multiton) systems and for mesoscale (millimeter to centimeter scale) systems; omnidirectional and holonomic mobility systems (an area in which RES holds a number of patents and an R&D 100 award); biomedical robotics (automated surgical assisting robots, prosthetics, rehabilitation-assist devices); actuation technologies for robotic operations in high-temperature environments; advanced logistics systems (cargo and weapons transport and handling); and microassembly (assembly of microscale/nanoscale components for three-dimensional micromachines).

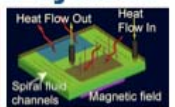


Robotics

Human-Amplifying Machines



Energy Transformation Systems



Power Transfer and actuation

