NRI: INT: MiaPURE (Modular, Interactive and Adaptive Personalized Unique Rolling Experience)

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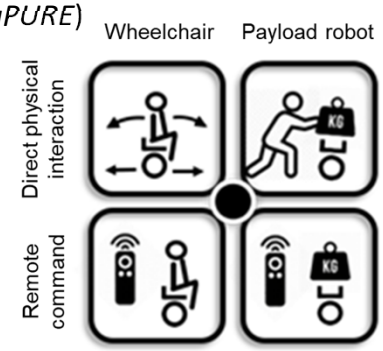
Challenge:

- Need disruptive approach for wheeled mobility
- Fundamental wheelchair design is same since 1800's
- Manual wheelchairs cause overuse injuries, limit hands for propulsion, constrained in tight spaces and certain terrains, and can tip/fall
- Power wheelchairs are heavy, costly, large, and hard to transport in vehicles

Solution: (*PURE*) *Personalized Unique Rolling Experience*

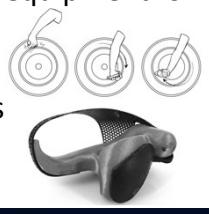
- Modular, interactive, adaptive design (*MiaPURE*)
- Common drivetrain: Ballbot
- Interchangeable top:
  - Wheelchair with Instrumented Seat
  - Heavy Payload Robot
- Multiple intuitive user interfaces:
  - Direct physical interaction
  - Remote command



Broader Impacts:

Established Human Performance and Mobility Maker Lab (HPML) within US Olympic National Training Site for Wheelchair Track at UIUC

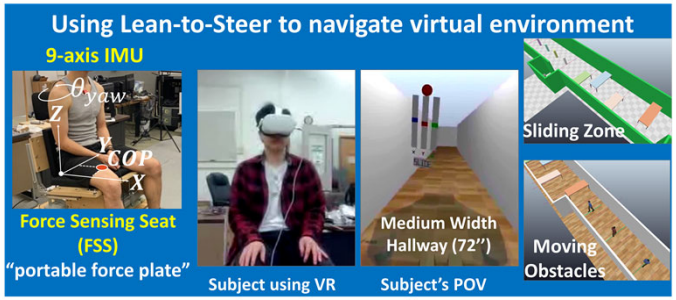
- 3D-printed bespoke adapted sports equipment for military veterans
- Weightlifting cuffs for quadriplegics
- 3D-printed racing wheelchair gloves



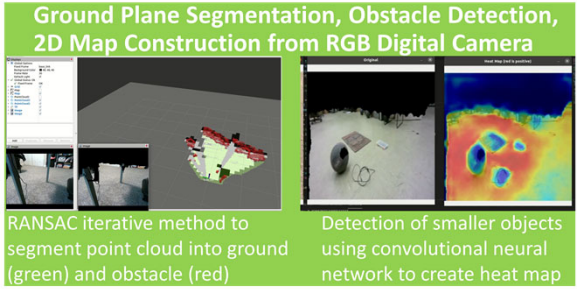
Scientific Impact:

- Family of compact, lightweight, agile, safe ball robots (ballbots)
- Novel human-robot interface (force sensing seat for hands-free control)
- Lower barriers for entry through open-source ballbot drivetrain platform able to support substantial load

Omni-directional motion | Self-balancing | Compact
Hands-free lean-to-steer motion | Obstacle detection and avoidance



Common 3-motor ballbot drivetrain for wheelchair and payload robot



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