Docket #: S20-043

Steerable Spherical Wheel Based Dexterous Hand for Object Grasping and Within-Hand Manipulation

The Salisbury lab has developed a dexterous robotic hand with active fingertip surfaces for grasping and manipulation. Spherical or oblate graspers exhibit two coupled degrees of freedom, steering and rolling, allowing objects to easily be manipulated by the wheels. Reorientation and object manipulation can occur without the need to move the robot arm, to release and regrasp objects, finger gaiting, or the complex algorithms governing those processes. This has the added benefit of grasping irregularly shaped, hard, or soft objects for versatile robotic manipulation applications.

Video description: Gen 1 system in action

Video description: Gen 2 system in action

Stage of Research

- Prototype

Applications

- **Robot grasping**
- Robot within-hand dexterous manipulation

Advantages

- **Dexterous manipulation without need for finger gaiting**
- Full 6 degree of freedom manipulation

Publications

- Yuan et al. IEEE International Conference on Robotics and Automation (2020) "Design of a Roller-Based Dexterous Hand for Object Grasping and Within-Hand Manipulation"
- Yuan et al. arXiv (2020) "Design and Control of Roller Grasper V2 for In-Hand Manipulation"

Patents

- Published Application: WO2021183466
- Published Application: 20230029226
- Issued: 12,722,312 (USA)

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