Update on the NIOSH Center for Occupational Robotics Research

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In today's presentation

- What is the Center for Occupational Robotics Research (CORR)?
- What does CORR do?
  - Intramural research
  - Extramural research
  - Partnerships

What is the
Center for Occupational Robotics Research?

The Center for Occupational Robotics Research (CORR)

- NIOSH virtual center established in September 2017
- Includes researchers from divisions and branches throughout NIOSH with a wide range of expertise
- Encompassed within the NIOSH *Future of Work* Initiative, which was launched in 2019

CORR Mission: Provide scientific leadership to guide the development and use of occupational robots that enhance worker safety, health, and wellbeing.

The Center for Occupational Robotics Research (CORR)

Focus areas:

- Identifying opportunities to better protect worker safety and health using robotics
- Increasing understanding of human and robot interactions to ensure human worker safety
- Improving the ability to identify and track injuries and fatalities involving robotics
- Providing guidance on working safely with robotics

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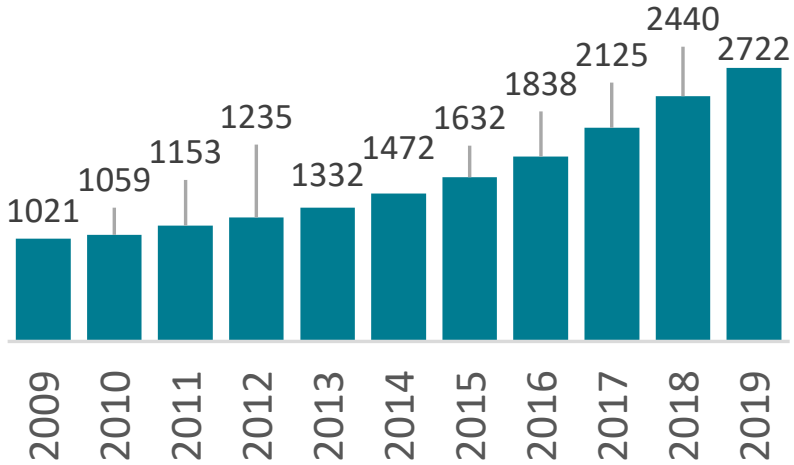
The Center for Occupational Robotics Research (CORR)

Scope of CORR research:

- Traditional industrial robots
- Emerging robotic technologies, such as:
  - Collaborative robots
  - Co-existing or mobile robots
  - Wearable robotics or powered exoskeletons
  - Remotely controlled or autonomous vehicles and drones
  - Future robots that will increasingly use advanced artificial intelligence

Operational Stock of Industrial Robots Worldwide (1,000 units)

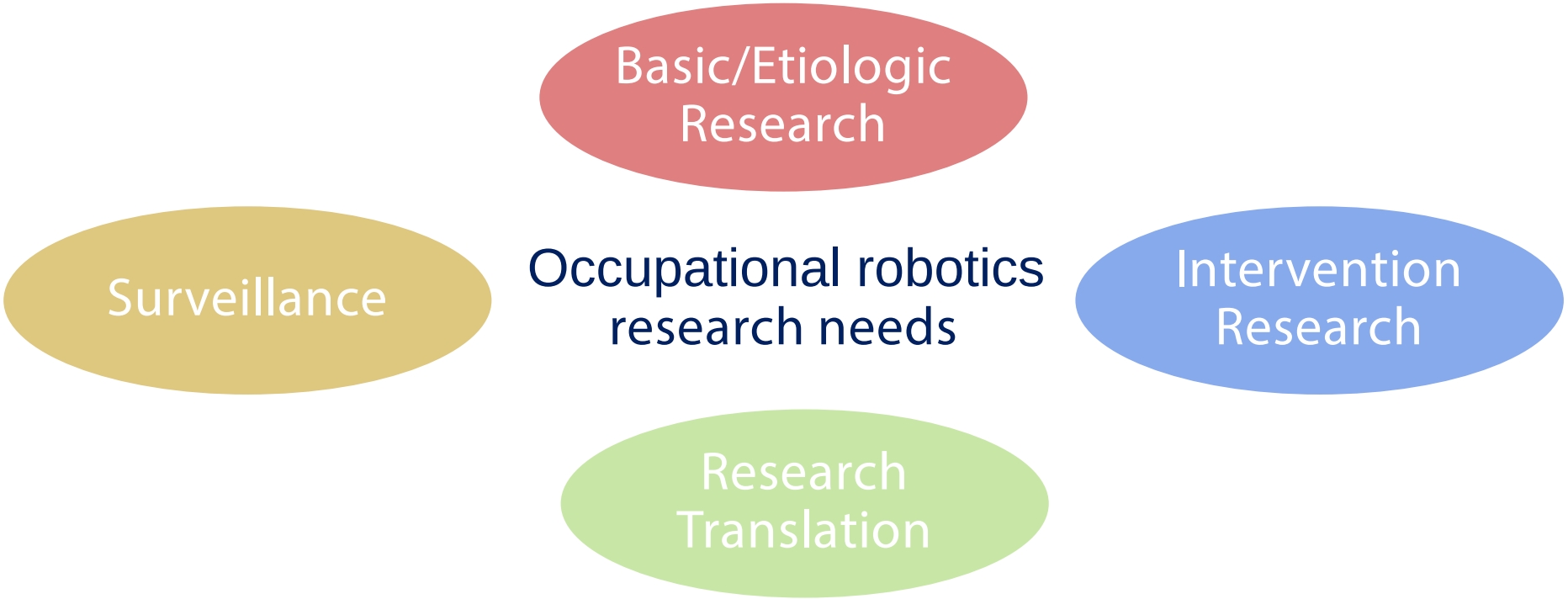


Data source: International Federation of Robotics [2020]. World Robotics Industrial Robots 2020

What does the Center for Occupational Robotics Research do?

Intramural Research

CORR conducts four types of research



Examples of Intramural NIOSH Robotics Research

Identification of Hazards and Risk Factors for Demolition Robot Operators

10/1/2020 – 9/30/2024

Image source: Washington State FACE Program [2019]. *Workers Severely Injured Using Demolition Robots. https://www.lni.wa.gov/safety health/safety-research/files/2019/DemolitionRobotAlert.pdf*

Examples of Intramural NIOSH Robotics Research

Large Truck Automation: Studying the Effect of Automation on Road Safety and Driver Behavior

10/1/2018 – 9/30/2022

PI: Md Mahmudur Rahman, PhD

Examples of Intramural NIOSH Robotics Research

Drone Use in Construction and Their Effects on Workers at Heights

2/7/2019 – 9/30/2020

PI: Darlene Weaver

Examples of Intramural NIOSH Robotics Research

Contact Avoidance between Human Workers and Collaborative Robots

2/26/2019 – 9/30/2020

PI: Marvin Cheng, PhD

What does the Center for Occupational Robotics Research do?

Extramural Research

Examples of Extramural Robotics Research Supported by NIOSH

- Evaluation of Trunk and Arm Support Exoskeletons for Construction
  - University of California, San Francisco and Virginia Tech
  - 9/1/2019 – 8/31/2024
- Customizable Lower-Limb Wearable Robot using Soft-Wearable Sensor to Assist Occupational Workers
  - University of Illinois Chicago
  - 9/15-2020 – 8/31/2023

Image source: NIOSH Science Blog: blogs.cdc.gov/niosh-science-blog/2016/03/04/exoskeletons/

Examples of Extramural Robotics Research Supported by NIOSH

Image source: NIOSH Science Blog: blogs.cdc.gov/niosh-science-blog/2017/10/23/drones-construction/

- Nebulizer-Retrofitted Drone Deployment at Residential Construction Sites
  - Univ. of Utah
  - 6/1/2020 – 5/31/2021
- Using Unmanned Aerial Systems for Automated Fall Hazard Monitoring in High-Rise Construction Projects
  - Univ. of Florida, George Mason Univ., Univ. of Utah
  - 8/16/2018 – 8/15/2019
- Safety Challenges of UAV Integration in the Construction Industry: Focusing on Workers at Heights
  - Univ. of Florida
  - 1/4/2021 – 1/4/2022

Examples of Extramural Robotics Research Supported by NIOSH

- Potential Ergonomic Benefits of Personal Collaborative Robots in Strawberry Harvesting
  - Western Center for Agricultural Health and Safety-Renewal, University of California-Davis
  - 9/30/2016 – 9/29/2021
- Probabilistic Posture Modeling Enhances the Ergonomics and Safety of Human-Robot Collaborations
  - Occupational Safety and Health Education and Research Centers (T42), University of Utah
  - 7/1/2018 – 6/30/2023

Image source: cdc.gov/niosh/topics/robotics/

What does the Center for Occupational Robotics Research do?

Partnerships

alliance
An OSHA Cooperative Program

A3
ASSOCIATION FOR ADVANCING AUTOMATION

October 5, 2017 signing ceremony for the
OSHA, NIOSH, A3 (formerly RIA) Alliance

ARM

ADVANCED ROBOTICS FOR MANUFACTURING

Image source: arminstitute.org

Research supported through the National Science Foundation (NSF) National Robotics Initiative (NRI):

- Customizable Lower-Limb Wearable Robot using Soft-Wearable Sensor to Assist Occupational Workers
- Transparent and Intuitive Teleoperation Interfaces for the Future Nursing Robots and Workers

ARM
ADVANCED ROBOTICS
FOR MANUFACTURING

PARTNERSHIP ON AI

WISCONSIN
UNIVERSITY OF WISCONSIN–MADISON

Jet Propulsion Laboratory
California Institute of Technology

For more information visit our webpage
cdc.gov/niosh/topics/robotics/

Thank you for your attention

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