



# Robotics in the Workplace

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# US Occupational Safety and Health

*Regulation/Enforcement/  
Consultation*

*Department of Labor  
(DOL)*

*Mine Safety and Health  
Administration  
(MSHA)*

*Occupational Safety and Health  
Administration  
(OSHA)*

*Research  
Recommendations*

*Department of  
Health and Human Services (HHS)*

*Centers for Disease  
Control and Prevention (CDC)*

*National Institute for Occupational  
Safety and Health (NIOSH)*

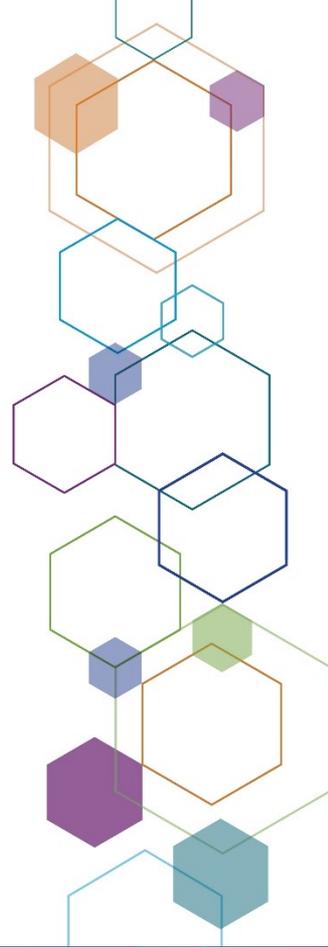
# Prevention Through Design (PtD)

## Potential

- Reduced human exposure
- Augmented human capabilities

## Concerns

- Increased interaction between humans and robots
- Rapid advances may outpace standards and regulations
- Psychosocial impacts of a changing workplace





# NIOSH Incident Surveillance

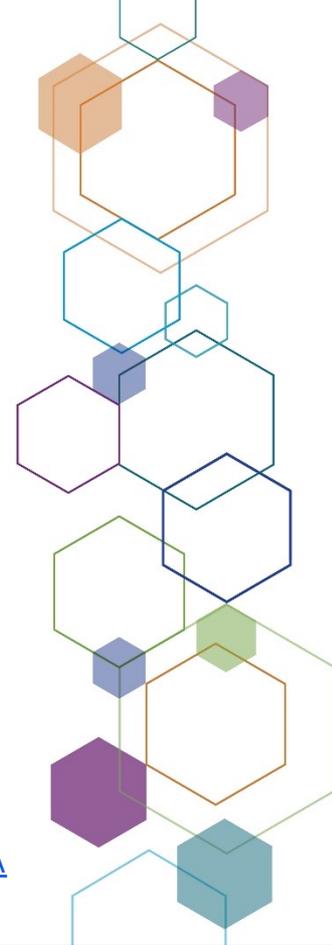
# Case Study

## Worker crushed by robotic forklift



Washington State FACE Program [2018].  
Warehouse worker crushed by forks of  
laser guided vehicle. Supported in part by  
NIOSH cooperative agreement.

[http://www.lni.wa.gov/Safety/Research/FA  
CE/Files/WorkerCrushedByLGVForks.pdf](http://www.lni.wa.gov/Safety/Research/FA CE/Files/WorkerCrushedByLGVForks.pdf)



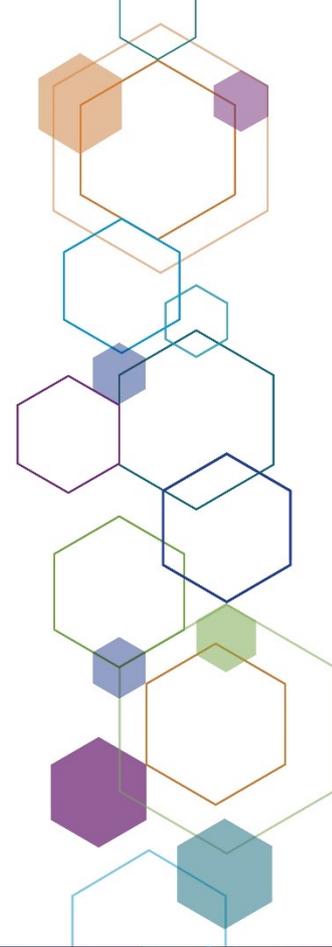
# Case Study

## Workers crushed by demolition robot



Washington State FACE Program [2019]. Workers Severely Injured Using Demolition Robots.  
Supported in part by NIOSH cooperative agreement.

<https://lni.wa.gov/safety-health/safety-research/files/2019/DemolitionRobotAlert.pdf>





# Research

# Laboratories and Facilities

Anthropometric Laboratory



Potential input for  
exoskeleton design

New Robotics Laboratory



Mobile and collaborative robots

# Simulation and Virtual Reality

## Truck Driving Simulator

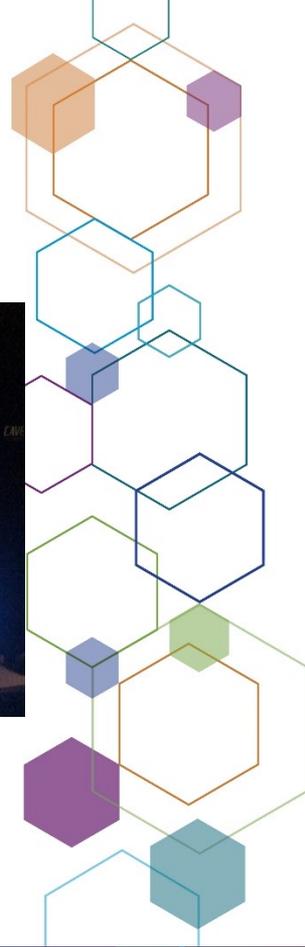


Effects of automation on truck drivers

## Virtual Reality Chamber

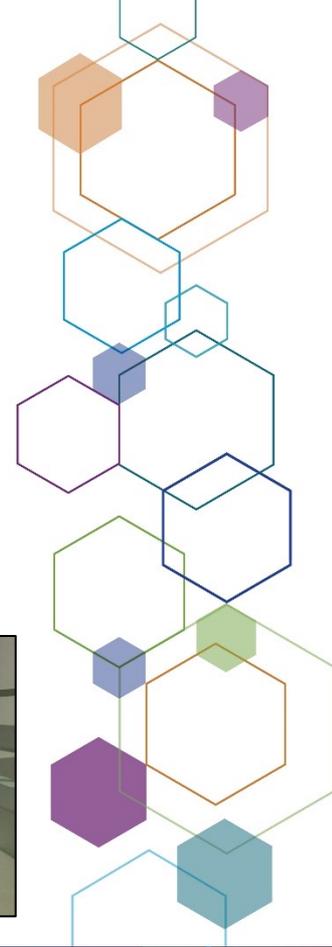
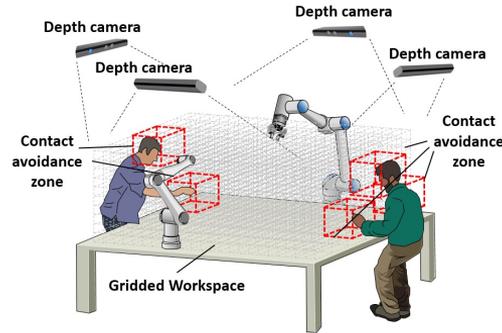
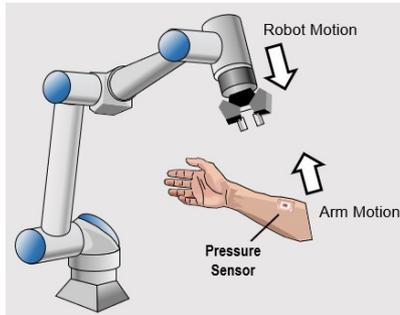


Working at elevation with drones, demolition robots, and human-robot collaboration.

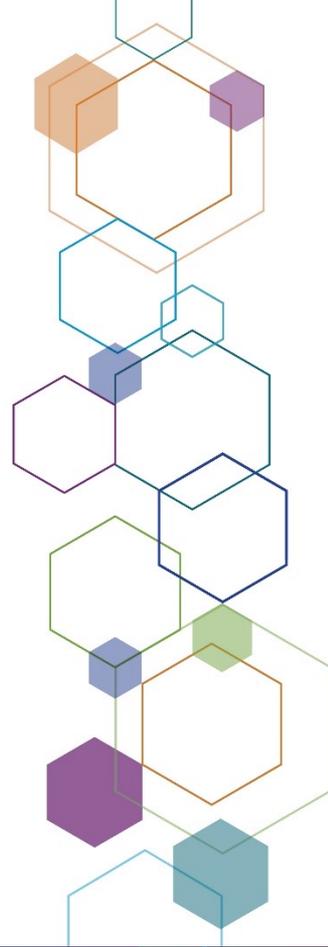


# Fundamental Research

- Human-Robot Collision Limits
- Safe Collaborative Working Environments
- Human-Robot Communication



# Mine Search and Rescue Robots





# Integrated Approach

# Research to Practice

- 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

*Surveillance*

*Basic/  
Etiologic  
Research*

*Occupational  
robotics  
research needs*

*Intervention  
Research*

*Research  
Translation*

# Consensus Standards Development

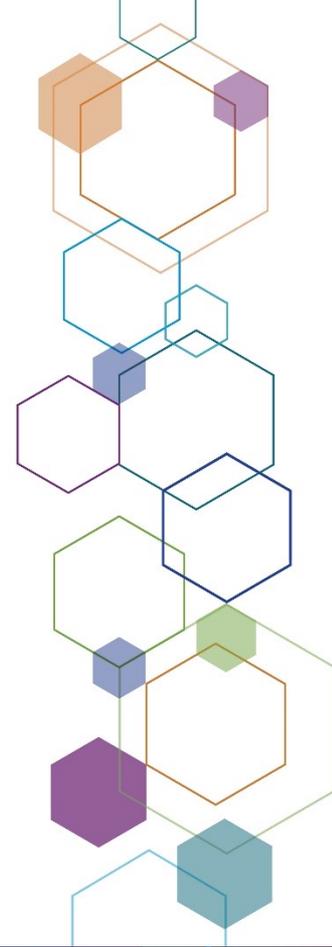
- ANSI/RIA R15.06 – Industrial Robots and Robot Systems Safety
- ANSI/RIA R15.08 – Industrial Mobile Robot Safety (NEW)
- ISO/TC 299– Robotics

## Under development

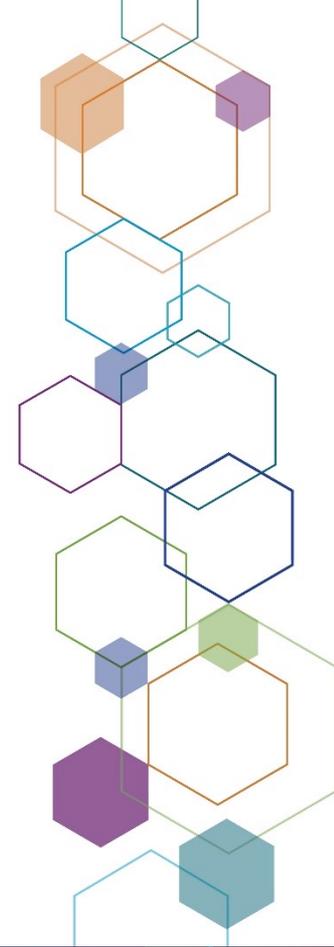
- ASTM F48 – **Exoskeletons and Exosuits**

## Pre-Standard

- ANSI **Unmanned Aircraft Systems** Standardization Collaborative Roadmap
- ANSI/ASSP/NSC Z15.3- Safety Management of **Partially and Fully Automated Vehicles** (*Technical report*)



# Partnerships



# Center for Occupational Robotics (CORR)

## Leadership Team



Dawn Castillo, MPH  
Manager, CORR  
Director, Division of Safety  
Research



Jacob Carr, PhD  
Coordinator, CORR  
Team Leader, Mining Systems  
Branch



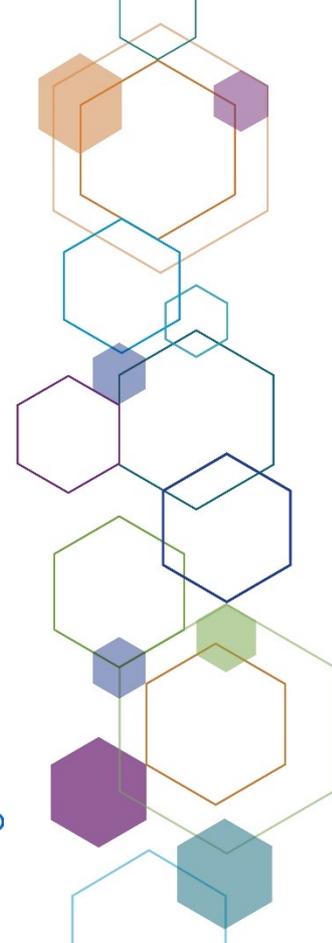
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Sharon Chiou, PhD  
Scientific Program Official,  
Office of Extramural Programs



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[www.cdc.gov/niosh/topics/robotics/](http://www.cdc.gov/niosh/topics/robotics/)



For more information, contact CDC  
1-800-CDC-INFO (232-4636)  
TTY: 1-888-232-6348 [www.cdc.gov](http://www.cdc.gov)

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