

worker-wearable worker-attachable industrial robotics

Technical Interchange Meeting. June 28 and 29, 2017. Washington, D.C.

MEETING SYNOPSIS

Announcement

U.S. Department of Energy (DOE), Office of Environmental Management (EM) will host the next technical interchange meeting on industrial exoskeletons on Wednesday, June 28 and Thursday, June 29, 2017. This meeting is an ongoing collaboration among the National Institute of Standards and Technology (NIST), the National Institute for Occupational Safety and Health (NIOSH), the U.S. Army Natick Soldier Research, Development and Engineering Center (NSRDEC), and several other U.S. federal government executive departments and independent agencies. For the purpose of this meeting, “exoskeleton” is a general term that includes robotic devices that are human-wearable or human-attachable.

Purpose

The purpose of this meeting is to engage the robotics community on industrial applications of human-wearable and human-attachable robotic devices to enable and proliferate use among the various occupational groups. Breakout sessions will be held to foster more detailed and open discussions. Actions and status from the exoskeleton technical interchange meeting held in January 2017 will be discussed.

Objectives

- Identify federal agencies and their respective interests, initiatives, projects, and deployments of human-wearable and human-attachable robotic devices for industrial applications
- Identify opportunities to transfer knowledge and technologies from medical and military applications to industrial applications
- Facilitate the active engagement of the robotics community and its stakeholders
- Begin to identify the key requirements and features needed to facilitate the proliferation of human-wearable and human-attachable robotic devices into the workforce
- Discuss terminology and standards among industrial end-users, Government industrial program leaders, insurance representatives, and the testing and standards community

Emergency Contact Phone Number (202) 586-8677, christi.sullivan@em.doe.gov

Meeting Host: Rodrigo Rimando, DOE-EM Director Technology Development Office, rodrigo.rimando@em.doe.gov, Office: (202) 287-1348

DOE-EM POC: JP Pabon (DOE-EM), jean.pabon@em.doe.gov, Office: (301) 903-9234, Mobile: (301) 820-5644

Technical POC: Jason Wheeler (SNL), jwwheel@sandia.gov, Office: (505) 284-6855, Mobile: (505) 366-4336

Meeting Synopsis (Updated June 22, 2017)

worker-wearable worker-attachable industrial robotics

Technical Interchange Meeting. June 28 and 29, 2017. Washington, D.C.

Participants

Subject matter experts, researchers and principal investigators, technologists, program/project managers, regulators, technology and service providers, stakeholders, and end-users from government, academic, industrial, and international communities are invited to this open meeting.

Location

The meeting will be held at the Crystal Gateway Marriott. 1700 Jefferson Davis Hwy, Arlington, VA 22202. Visit <http://www.marriott.com/hotels/travel/wasgw-crystal-gateway-marriott>.

Registration

Register for this meeting at <https://www.nist.gov/news-events/events/2017/06/technical-interchange-meeting-industrial-exoskeletons>, which closes on Friday, March 23, 2017. Onsite registration will be available. There is no registration fee or cost for attendance.

Attire

The attire is Business Casual for the meeting. Military personnel are not required to wear uniforms.

Emergency Contact Phone Number (202) 586-8677, christi.sullivan@em.doe.gov

Meeting Host: Rodrigo Rimando, DOE-EM Director Technology Development Office, rodrigo.rimando@em.doe.gov, Office: (202) 287-1348

DOE-EM POC: JP Pabon (DOE-EM), jean.pabon@em.doe.gov, Office: (301) 903-9234, Mobile: (301) 820-5644

Technical POC: Jason Wheeler (SNL), jwwheel@sandia.gov, Office: (505) 284-6855, Mobile: (505) 366-4336

Meeting Synopsis (Updated June 22, 2017)

worker-wearable worker-attachable industrial robotics

Technical Interchange Meeting. June 28 and 29, 2017. Washington, D.C.

TRAVEL CONSIDERATIONS

Airports

There are three major airports in the Greater Washington Metropolitan Area: Ronald Reagan Washington National Airport (DCA); Dulles International Airport (IAD); and Baltimore/Washington International Thurgood Marshall Airport (BWI). Visit www.flyreagan.com, www.flydulles.com, and www.bwiairport.com, respectively.

Hotels

There are approximately 130 hotels with over 31,300 rooms located in Washington, D.C. The Greater Washington Metropolitan Area is home to over 690 hotels with over 111,200 rooms. Those that are most convenient to both Ronald Reagan Washington National Airport and the Forrestal Building are located in the urban, unincorporated neighborhoods of Pentagon City and Crystal City in the southeastern corner of Arlington County, Virginia, south of downtown Washington, D.C. The corresponding METRO rail stations are the Pentagon Station, Pentagon City Station, and Crystal City Station all of which service the Yellow Line (the shortest and most direct to the Forrestal Building via L'Enfant Plaza Station).

Public Transportation

Public transportation is provided by the Washington Metropolitan Area Transit Authority (WMATA), commonly referred as Metro, in the Washington D.C. metropolitan area. WMATA provides rapid transit service under the Metrorail name, fixed-route bus service under the Metrobus and Metroway brand, and paratransit service under the MetroAccess brand. The authority is also part of a public-private partnership that operates the DC Circulator bus system. Visit <https://www.wmata.com> for more information and a “trip planner” tool. For your convenience, a map of Metrorail and Metroway (bus service that operates Pentagon City and Braddock Road Metrorail stations).

Emergency Contact Phone Number (202) 586-8677, christi.sullivan@em.doe.gov

Meeting Host: Rodrigo Rimando, DOE-EM Director Technology Development Office, rodrigo.rimando@em.doe.gov, Office: (202) 287-1348

DOE-EM POC: JP Pabon (DOE-EM), jean.pabon@em.doe.gov, Office: (301) 903-9234, Mobile: (301) 820-5644

Technical POC: Jason Wheeler (SNL), jwwheel@sandia.gov, Office: (505) 284-6855, Mobile: (505) 366-4336

Meeting Synopsis (Updated June 22, 2017)

worker-wearable  **worker-attachable**
industrial robotics

Technical Interchange Meeting. June 28 and 29, 2017. Washington, D.C.

MEETING AGENDA (PRELIMINARY)

Wednesday, June 28, 2017	
8:00 to 9:00 AM	Arrival and Sign-in
9:00 to 9:30 AM	Welcome, Introduction, & Objectives. Rod Rimando (DOE/EM)
9:30 to 10:15 AM	Workforce Perspective. Speaker: Jim Key (United Steelworkers, Atomic Energy Workers Council)
10:15 to 10:30 AM	Break
10:30 to 11:15 AM	Industry (Retail) Perspective. Speakers: Amanda Manna (Lowe’s) and Alan Asbeck (Virginia Polytechnic Institute and State University)
11:15 AM to 12:00 PM	Workplace Physical Demands and Musculoskeletal Injury Surveillance. Speaker: Brian Lowe (NIOSH)
12:00 to 1:00 PM	Lunch and Networking
1:00 to 1:45 PM	Industry (Ergonomics) Perspective. Speaker: Matthew Marino (Briotix, Inc.)
1:45 to 2:15 PM	Industry (Automotive) Perspective. Speaker: Jun Ashihara (Honda Motor Co., Ltd.)
2:15 to 2:30 PM	Overview and Objectives of Topical Breakout Sessions. Jason Wheeler (DOE Sandia National Laboratories)
2:30 to 2:45 PM	Break. Assemble for breakout sessions.
2:45 to 4:45 PM	Test Methods and Metrics Breakout Session
	Ergonomics Breakout Session
	Sizing and Fitting Breakout Session
	Risks and Regulation Breakout Session
4:45 to 5:00 PM	Day #1 Recap and Follow-Up Discussions. Day #2 Agenda Review.
5:00 PM	Day #1 Meeting Adjourn

Emergency Contact Phone Number (202) 586-8677, christi.sullivan@em.doe.gov

Meeting Host: Rodrigo Rimando, DOE-EM Director Technology Development Office, rodrigo.rimando@em.doe.gov, Office: (202) 287-1348

DOE-EM POC: JP Pabon (DOE-EM), jean.pabon@em.doe.gov, Office: (301) 903-9234, Mobile: (301) 820-5644

Technical POC: Jason Wheeler (SNL), jwwheel@sandia.gov, Office: (505) 284-6855, Mobile: (505) 366-4336

Meeting Synopsis (Updated June 22, 2017)

worker-wearable  **worker-attachable**
industrial robotics

Technical Interchange Meeting. June 28 and 29, 2017. Washington, D.C.

MEETING AGENDA (PRELIMINARY)

Thursday, June 29, 2017	
7:30 to 8:00 AM	Arrival and Sign-in
8:00 to 8:15 AM	Day #2 Agenda Review
8:15 to 8:30 AM	Group photo
8:30 to 9:30 AM	10-Minute Power Breakout Debriefs. Discussion.
9:30 to 10:00 AM	Break
10:00 to 10:45 AM	Industry (Automotive) Perspective. Speaker: Frank Pochiro (BMW Manufacturing Co., LLC)
10:45 to 11:30 AM	Industry (Automotive) Perspective. Speaker: Marty Linn (General Motors) and Josh
11:30 AM to 12:45 PM	Lunch and Networking
12:45 to 1:30 PM	User Group Perspective. Speaker: Thomas Sugar (Wearable Robotics Association (WearRA))
1:30 to 2:15 PM	Standards, Terminology Working Group, ASTM Standards Development. Speaker: Roger Bostelman (NIST)
2:15 to 2:45 PM	Break
2:45 to 3:15 PM	Update on Military Applications. Speaker: Michael Samuel (NSRDEC)
3:15 to 4:00 PM	Update on Medical Applications. Speaker: Kendra Betz (U.S. Department of Veterans Affairs) and Vivek Pinto (U.S. Food and Drug Administration)
4:00 to 4:45 PM	Open Discussion: Discuss next steps
4:45 to 5:00 PM	Closing Remarks: Rod Rimando (DOE/EM)
5:00 PM	Technical Interchange Meeting Adjourn

Emergency Contact Phone Number (202) 586-8677, christi.sullivan@em.doe.gov

Meeting Host: Rodrigo Rimando, DOE-EM Director Technology Development Office, rodrigo.rimando@em.doe.gov, Office: (202) 287-1348

DOE-EM POC: JP Pabon (DOE-EM), jean.pabon@em.doe.gov, Office: (301) 903-9234, Mobile: (301) 820-5644

Technical POC: Jason Wheeler (SNL), jwwheel@sandia.gov, Office: (505) 284-6855, Mobile: (505) 366-4336

Meeting Synopsis (Updated June 22, 2017)

worker-wearable worker-attachable industrial robotics

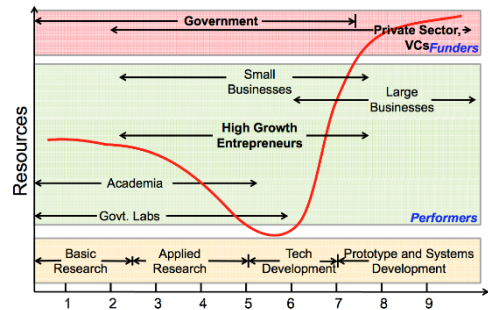
Technical Interchange Meeting. June 28 and 29, 2017. Washington, D.C.



Breakout Sessions

To overcome the technology “valley of death,” a bridge must be built to ultimately provide the path for tooling the workforce with these new robotic technologies.

These breakout sessions will first identify those planks and then brainstorm on ways to lay them on the bridge.



Plank Breakout

Discussion: Exoskeleton developers have struggled to design and execute specific experiments to determine the efficacy of their devices in realistic environments. For example, if a wearable system reduces the load on joints but increases the metabolic cost of the user, how do we know if that is a net win for the workers? There is a need to identify and standardize test methods and metrics that are relevant to the end application. Consistent and realistic control conditions also need to be generated. This session will discuss these challenges.

Facilitator: NIST (Bill Billotte and Roger Bostelman)



Plank Breakout

Discussion: For an industrial exoskeleton system to be useful, it must reduce the forces acting on the body such that the risks of injuries are reduced, and be practical and safe to use. While these systems provide specific benefits to the user, they may also create other challenges. For instance, increasing the user’s time on task may increase exposures to other physical agents (respiratory, noise, hand-transmitted vibration, and transference of load to other muscle groups). This session will discuss ergonomic considerations of exoskeletons as a control technology to prevent workplace fatigue and injury and the ergonomic effects of exoskeletons on users.

Facilitator: NIOSH (Brian Lowe and Tom McDowell)

Emergency Contact Phone Number (202) 586-8677, christi.sullivan@em.doe.gov

Meeting Host: Rodrigo Rimando, DOE-EM Director Technology Development Office, rodrigo.rimando@em.doe.gov, Office: (202) 287-1348

DOE-EM POC: JP Pabon (DOE-EM), jean.pabon@em.doe.gov, Office: (301) 903-9234, Mobile: (301) 820-5644

Technical POC: Jason Wheeler (SNL), jwwheel@sandia.gov, Office: (505) 284-6855, Mobile: (505) 366-4336

Meeting Synopsis (Updated June 22, 2017)

worker-wearable worker-attachable industrial robotics

Technical Interchange Meeting. June 28 and 29, 2017. Washington, D.C.



Plank Breakout

Discussion: Workers come in all shapes and sizes. Exoskeletons must be designed to comfortably accommodate this variability. The interfaces to the person are critical for comfort and function of the device. As industrial exoskeletons enter the marketplace, how can design and manufacturing efforts ensure the devices fit a high percentage of the workforce comfortably? What are the tradeoffs between adjustability and multiple sizes? Are the conventional size charts for clothing/apparel useful for exoskeletons? What issues exist for exoskeletons that are worn outside of clothes or PPE compared to those worn underneath clothes/PPE. What are the donning and doffing issues, particularly donning for first responders and doffing for emergency evacuations or personal medical emergencies?

Facilitator: DOE Sandia National Laboratories (Jason Wheeler)



Plank Breakout:

Discussion: As exoskeletons begin to permeate industrial environments, care and thought must be given to risks, liabilities and regulations around their use. It is not yet clear what role the government, insurance companies, unions, and employers play in this process. How is fitness-for-service assessed? What are the requirements for basic knowledge, proficiency, and refresher training established? Should the use of exoskeletons be a personal choice? Today's wearable technologies are now equipped with activity/fitness trackers for monitoring (tracking) physiological parameters such as heartbeat, calorie consumption, heartbeat, core body temperature, and muscle motion. Is it fair or reasonable to compare such metrics of a worker that is 25 years old with that of a worker that is 50 years old wearing? This session will discuss the risks and regulatory challenges of exoskeletons and potential roles of the various stakeholders.

Facilitator: DOE Savannah River National Laboratory (Richard Minichan)

Emergency Contact Phone Number (202) 586-8677, christi.sullivan@em.doe.gov

Meeting Host: Rodrigo Rimando, DOE-EM Director Technology Development Office, rodrigo.rimando@em.doe.gov, Office: (202) 287-1348

DOE-EM POC: JP Pabon (DOE-EM), jean.pabon@em.doe.gov, Office: (301) 903-9234, Mobile: (301) 820-5644

Technical POC: Jason Wheeler (SNL), jwwheel@sandia.gov, Office: (505) 284-6855, Mobile: (505) 366-4336

Meeting Synopsis (Updated June 22, 2017)

M System Map

wmata.com
 Customer Information Service: 202-637-7000
 TTY Phone: 202-962-2033
 Metro Transit Police: 202-962-2121

Legend

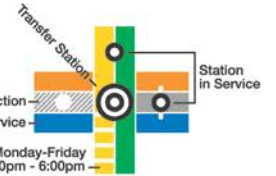
- RD** Red Line • Glenmont / Shady Grove
- OR** Orange Line • New Carrollton / Vienna
- BL** Blue Line • Franconia-Springfield / Largo Town Center
- GR** Green Line • Branch Ave / Greenbelt
- YL** Yellow Line • Huntington / Fort Totten
- SV** Silver Line • Wiehle-Reston East / Largo Town Center

Station Features

- Bus to Airport
- Parking
- Hospital
- Airport

Connecting Rail Systems

- AMTRAK
- VRE
- AMBC



MetroRail Operating Times
Mon-Fri
 5am-midnight
Sat-Sun
 7am-midnight
 Times are approximate

N
 Map is not to scale

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY © 2015

REV. 12/01/16



No Smoking



No Eating or Drinking



No Animals (except service animals)



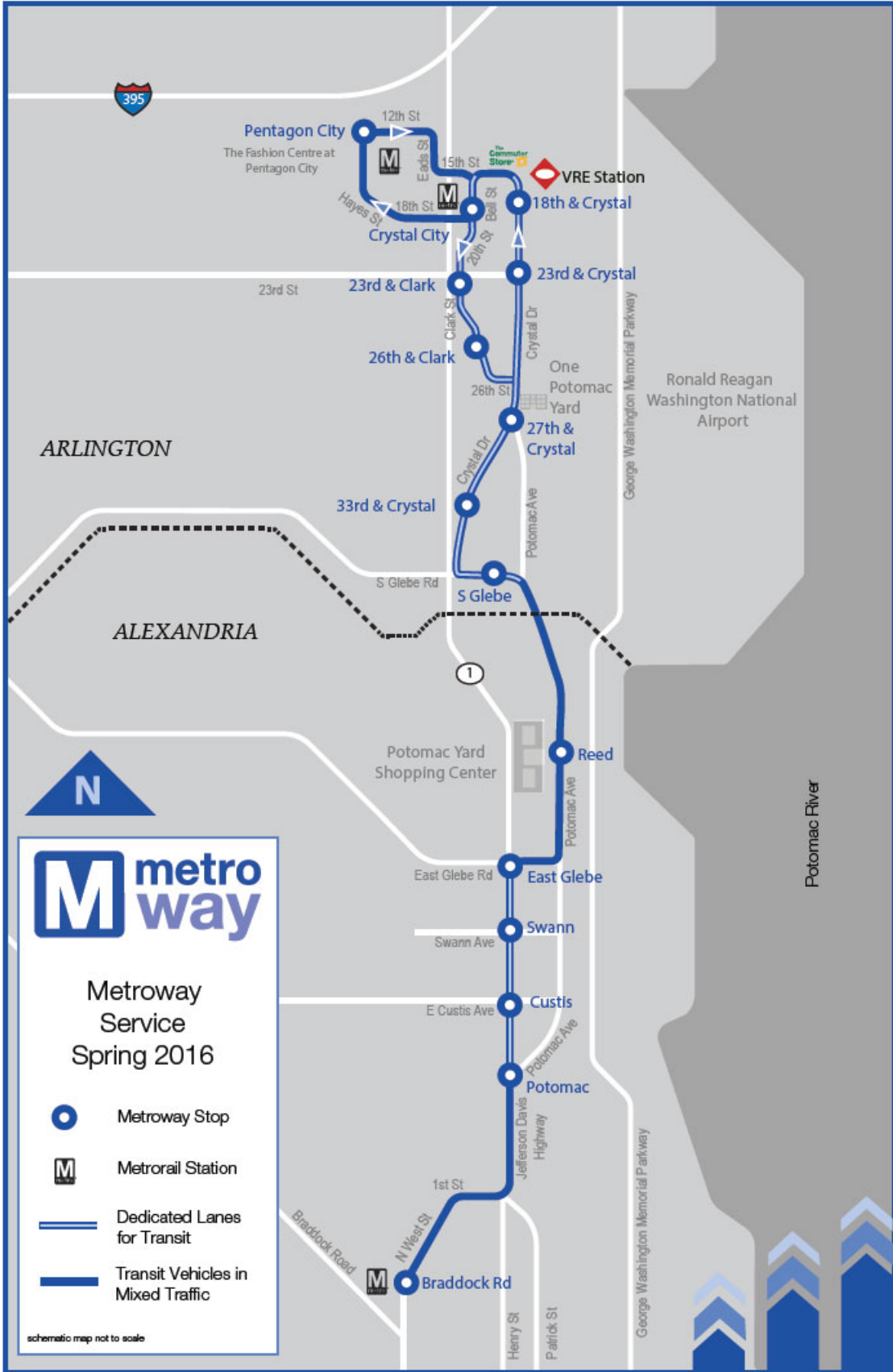
No Audio (without earphones)



No Littering or Spitting



No Dangerous or Flammable Items





(<http://metrowayva.com>)

Route

The Route

Metroway operates between Pentagon City and Braddock Road Metrorail stations, with a new stop at 33rd and Crystal Drive. Operating stations include:

Northbound

Braddock Rd Metro
Potomac Avenue
Custis Avenue
Swann Avenue
East Glebe Road
Reed Avenue
South Glebe Road
33rd Street & Crystal Drive
27th Street & Crystal Drive
23rd Street & Crystal Drive
18th Street & Crystal Drive
Crystal City Metro
Pentagon City Metro

Southbound

Pentagon City Metro
Crystal City Metro
23rd Street & Clark Street
26th Street & Clark Street
27th Street & Crystal Drive
33rd Street & Crystal Drive
South Glebe Road
Reed Avenue
East Glebe Road
Swann Avenue
Custis Avenue
Potomac Avenue
Braddock Rd Metro