Request for genIC Approval
CDC/ATSDR Direct Reading Methodologies, Sensors, and Robotics Technology Assessment in Lab/Simulator-based Settings
0920-1441

CIO: The Centers for Disease Control and Prevention (CDC), National Institute for Occupational Safety and Health (NIOSH), Division of Safety Research (DSR)

PROJECT TITLE: The Identification of Hazards and Risk Factors for Demolition Robot Operators

PURPOSE AND USE OF COLLECTION:

The Centers for Disease Control and Prevention (CDC), National Institute for Occupational Safety and Health (NIOSH), Division of Safety Research (DSR) seeks approval from the Office of Management and Budget (OMB) to conduct research around the effectiveness of a sub-set of automated direct reading methodologies, sensor technologies, and robotics technologies that are used to protect worker safety and health.

For the case of this collection titled *"The Identification of Hazards and Risk Factors for Demolition Robot Operators,"* data will be collected in NIOSH's Virtual Reality Lab in Morgantown, West Virginia, to study various risk factors that cause the operators of demolition robots to position themselves within hazardous zones of the robot; that is, within an area near the robot where they could be hit, pinned, or crushed by any part of the robot.

Objectives will be accomplished during two simulated studies:

1. Study 1: Identify hazards and risk factors (human-related, environment-related, and control-pad interface-related) that may lead operators to position themselves within a hazardous area of the simulated robot.
2. Study 2: Understand human behavior and perceptions of safety and trust when the simulated robot moves unexpectedly while participants are operating it to conduct demolition tasks.

Participants will operate a virtual demolition robot, using actual physical demolition robot remote controls, to complete various demolition tasks. Different virtual demolition scenarios will be developed including vertical wall and ground demolition. Similarly, virtual scenarios with unexpected robot motions will be used, including outrigger motion, arm swing motion, hydraulic hose fail, and structure fail. Participants will be recruited (Attachment A) and, before taking part in the study, will be screened for simulator sickness susceptibility. If participants experience car sickness or simulator sickness from playing video games, they are not eligible to participate.

Demographic information, experience of the participant in construction work, mental load, safety perception, and trust in the virtual demolition robot will be collected using a paper/pencil questionnaire. Questions are shown in Attachments B, C, D, E, and F and Informed Consent is shown in Attachment G. Note that all data collection instruments shown in Attachments B through F are included in the genIC package 0920-1441. Motion data will be collected and stored in the VICON Motion Analysis computer in the Virtual Reality Laboratory. This includes measures of the body's movement through space with respect to the virtual demolition robot (biomechanics) and performance data (time to complete each assigned task).

All paper forms and digital data will be coded with a unique ID number for each participant. The enrollment log will be kept in a locked cabinet and will be available only to the named investigators. The raw data with the unique ID number will be entered and stored on a server computer. Data on the server is backed-up daily. Two levels of physical security are always maintained for the data libraries—controlled office access, and ID/password access to data storage devices. Results from this study will be used to generate basic scientific knowledge to support a reduction in the incidence of demolition robot-related traumatic injuries and fatalities among construction workers.

DESCRIPTION OF RESPONDENTS

The respondent universe will be recruited from the general population, but demographic characteristics are expected to be reflective of the full spectrum of the U.S. workforce. Respondents will be recruited via a variety of avenues (e.g., email, flyers, advertisements) and are expected to vary in gender, age, race, ethnicity, rural/urban locations, and/or in specific regions or health jurisdictions.

For the information collection "*The Identification of Hazards and Risk Factors for Demolition Robot Operators"* project, no more than 200 individuals will be recruited with a target of 122 participants. Participants will be 18 years of age or older and have professional experience in the construction industry. The demographic composition of the participants will reflect the demographic composition of construction workers across the United States as closely as possible. This composition, according to data from the Bureau of Labor Statistics (2018), is 9.9% women, 88.4% White, 6.2% Black or African American, 2.0% Asian, and 30.7% Hispanic or Latino.

CERTIFICATION:

I certify the following to be true:

1. The collection is voluntary.
2. The collection is low-burden for respondents and low-cost for the Federal Government.
3. The collection is non-controversial and does <u>not</u> raise issues of concern to other federal agencies.
4. Information gathered will not be used to substantially inform influential policy decisions.
5. The study is not intended to produce results that can be generalized beyond its scope.

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To assist review, please answer the following questions:

Personally Identifiable Information:

1. Is personally identifiable information (PII) collected? [ ] Yes [X] No
2. If Yes, is the information that will be collected included in records that are subject to the Privacy Act of 1974? [ ] Yes [X] No
3. If Applicable, has a System or Records Notice been published? [ ] Yes [X] No

Gifts or Payments:

Is an incentive (e.g., money or reimbursement of expenses, token of appreciation) provided to participants? [x] Yes [ ] No

In this study, participants will be compensated for their participation at a rate of $30/hour. Partial hour payments will also be issued at the rate of $10 per 20 minutes, and shorter periods will be rounded up to a full 20-minute period. Participants recruited for Study 1 and Study 2 will make one visit to the laboratory, which is estimated to take approximately 4 hours. A Record of Test Subject Participation Form (Attachment H) will be kept in a locked file cabinet to track reimbursement by recording the amount paid to each participant in a data log. Participant identity will be kept confidential using a subject ID code and will also not be linked to the individual data provided during participation.

BURDEN HOURS

This project is comprised of two studies that, at a maximum, will recruit and burden 172 individuals: a) Study 1 requires up to 76 human subjects, and b) Study 2 requires up to 96 human subjects. However, human subjects are eligible to participate in both studies if desired. Although it is quite possible that a sample of human subjects will volunteer to participate in both Study 1 and Study 2, Table 1 reflects the maximum number of burden hours possible, indicating unique participants for Study 1 and 2. Burden hours are shown below in Table 1.

Table 1. Burden hours

Category of Respondent	Form Name	Number of Respondents	Number of Responses per Respondent	Average Hours Per Response	Total Response Burden (Hours, rounded up/down)
Members of the general public who are employed in the construction sector.	Informed Consent	172	1	10/60	29
	Demographics/ construction and robot experience questionnaire	172	1	10/60	29
	Virtual Reality Sickness Questionnaire	172	2	10/60	58
	Installation/ removal of the wearable markers for Study 1.	76	2	10/60	25
	Installation/ removal of the wearable markers for Study 2.	96	2	10/60	32
	NASA Task Load Index	96	3	5/60	24
	Robot Trust Questionnaire	96	3	5/60	24
	Post-Test Questionnaire	172	1	10/60	29
Total					250

FEDERAL COST: The estimated annual cost to the Federal government is $58,716.40

The estimated number of participants per study, the number of test hours per participant, and the amount of compensation per participant, as well as the totals, are shown in Table 2. The cost for compensating participants of the data collection process for this project is $13,220.00. In addition to this compensation cost, the cost of two researchers conducting and overseeing the study (one GS11-10, and one GS13-8) for a total of 428 hours each is $45,496.40, as shown in Table 3. Therefore, the total estimated cost to the Federal Government is $58,716.40.

Table 2. Estimated number of participants, duration of tests and compensation.

	Number of Participants	Testing Hours per Participant	Total Hours of Testing	Compensation per Participant	Total Compensation
Studies 1 & 2	50	4.5	225	$140.00	$ 7,000.00
Study 1 only	26	2.5	65	$ 80.00	$ 2,080.00
Study 2 Only	46	3.0	138	$ 90.00	$ 4,140.00
Total	**122**		**428**		**$ 13,220.00**

Table 3. Estimated cost for two researchers GS11 and GS13 to conduct and oversee data collection.

	Total Hours of Testing	Hourly Rate for GS11 Researcher	Total Cost of GS11 Researcher	Hourly Rate for GS13 Researcher	Total Cost of GS13 Researcher	Total Staff Cost
Studies 1 & 2	225	45.19	$ 10,167.75	61.11	$ 13,749.75	$ 23,917.50
Study 1 only	65	45.19	$ 2,937.35	61.11	$ 3,972.15	$ 6,909.50
Study 2 Only	138	45.19	$ 6,236.22	61.11	$ 8,433.18	$ 14,669.40
Total	**428**		**$ 19,341.32**		**$ 26,155.08**	**$ 45,496.40**

If you are conducting a focus group, survey, or plan to employ statistical methods, please provide answers to the following questions:

The selection of your targeted respondents

1. Do you have a customer list or something similar that defines the universe of potential respondents and do you have a sampling plan for selecting from this universe? [] Yes [X] No

If the answer is yes, please provide a description of both below (or attach the sampling plan)? If the answer is no, please provide a description of how you plan to identify your potential group of respondents and how you will select them?

Because this generic clearance covers a wide range of studies, each individual project submitted under this generic clearance will clearly define the specific data collection methods and procedures. Individual data collections will be time-limited and generally conducted over one study visit, but sometimes responding to various technology-based scenarios to identify unintended consequences of human-technology interactions and integrations into job tasks.

For this project, potential respondents will be identified through targeted recruitment efforts or a convenience selection of key informants selected from the relevant study population. Screening questions will be used to determine eligibility. See Attachment A for the recruitment flyer and screening script to be used during recruitment.

Refer to attached sampling plan for this information, which also highlights the consent process (Attachment G) to inform potential participants of the private and voluntary nature of the study and provide general information about the study, the topics to be covered in the study, potential risks, and the token of appreciation available for completing the study.

Administration of the Instrument

1. How will you collect the information? (Check all that apply)

    [ ] Web-based or other forms of Social Media

    [x] Telephone

    [x] In-person

    [ ] Mail

    [ ] Other, Explain

2. Will interviewers or facilitators be used? [x] Yes [ ] No