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: Investigation on safety and trust when working alongside industrial mobile robots

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.

The objective of this request is to enable NIOSH to engage in information collection activities that are focused on assessment and perceptual experiences that will result in new or improved technology designs that may inform standards development, adoption of best practices when developing and implementing new technologies, the development of interventions, and technology development and testing that decrease burden to the public. Outcomes will inform ongoing research and development of resonant technologies along with complementary practices for integrating new technologies in the workplace to reduce unintended outcomes.

For this specific information collection request, we will collect data for a project titled *"Investigation on safety and trust when working alongside industrial mobile robots"* in NIOSH's Robotics Lab in Morgantown, West Virginia. The primary aim of this research is to Investigate human behavior and perceptions of safety and trust while interacting with multiple industrial mobile robots (IMRs) with varying characteristics (i.e., size and separation distance) that are designed to work in close cooperation in a shared workspace.

This is a single-session in-laboratory study. Participants will be asked to participate in two experiments that each include 12 conditions. Experiment 1 will investigate comfort level when being approached by one vs. two IMRs. Participants will stand in the middle of the laboratory and rate their comfort level after each test condition including number of approaching IMRs (1 vs. 2), height (shorter vs. taller), and separation distance (0.5m, 1.0m, and 1.5m). Experiment 2 will investigate human behavior and perceived safety and trust when completing a task that will involve transferring a box from one side of the laboratory to the other while working alongside one or two IMRs that vary in height and separation distance. The goal of this research is to identify causes of human-IMR collisions in a shared workspace and ways to reduce potential injuries that could occur during human-IMR collaboration.

Participants will be recruited and screened for eligibility before taking part in the study (Attachment A and K). Participants will sign the informed consent form at the start of the experiment sessions (Attachment B). For both experiments we will collect demographic information (Attachment C) and

participant experience working with robots and their attitudes toward them (Attachment D). For the demographic information, we are using Figure 2 in OMB's SPD-15 guidance because we do not plan on doing an in-depth analysis of race/ethnicity, so we do not believe participants need to report their country of origin using the detailed race and ethnicity questionnaire in Figure 1. For experiment 1 we will collect participant's perceived comfort level (Attachment E) and measure stress levels. For experiment 2 we will measure task performance, human motion behaviors, and stress levels. We will also administer an 8-item post-interaction questionnaire on satisfaction with robot, perceived safety, comfort, and trust (Attachment F), and a 5-item survey that includes questions about the robot's attributes (Attachment G).

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.

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. manufacturing workforce. For this information collection, the target sample size is 71 participants. We will recruit up to 89 participants to account for potential dropouts. Participants will be 18 years of age or older and have experience working in the manufacturing industry, warehousing industry, or in a stockroom. The demographic composition of the participants will reflect the demographic composition of the manufacturing and warehousing industries across the United States as closely as possible. In manufacturing, workers who are female represent 30% worker population and workers who are Black, Asian, and Hispanic/Latino people represent 11%, 8%, and 18%, respectively. In warehousing, women, Black, Asian, and Hispanic/Latino races/ethnicities represent 25%, 21%, 6%, and 21%, respectively.

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.

Name: Justin Haney

To assist review, please answer the following questions:

Personally Identifiable Information:

SSPO determined in conjunction with the CDC Privacy Office that the Privacy Act is not applicable. NIOSH will not receive any identifiable information from any of the individual projects. Information will be removed from any data sent to NIOSH, and NIOSH will, at no time, have any access to any local data that contains identifiers.

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 the study will make one visit to the laboratory, which is estimated to take approximately 2.5 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 includes 1 study that, at a maximum, will recruit and burden 89 individuals. A summary of the data collection activities, the number of responses per respondent, and the average response time per respondent is provided in Table 1 for these data collection activities.

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)
Individuals: Manufacturing, warehousing, and/or stockroom workers	Participant Recruitment	89	1	10	15
	Informed Consent Form	89	1	5/60	7
	Pre-study Questionnaire: Demographic Survey	89	1	1/60	1
	Pre-study Questionnaire: Robot Experience	89	1	2/60	3
	Experiment 1: Comfort Level Questionnaire	89	12	1/60	18
	Experiment 1 and 2 equipment set up and practice with participants	89	1	10/60	14
	Experiment 2: Post-Interaction Questionnaire	89	12	2/60	36
	Experiment 2: Robot Attribute Ratings	89	12	1/60	18
	Remove testing equipment from	89	1	5/60	7

	participants				
Total					119

FEDERAL COST: The estimated annual cost to the Federal government is **$29,018.45.**

The cost for compensating participants of the data collection process for this project is $7,120. In addition to this compensation cost, the cost of two researchers conducting and overseeing the study (one GS12-5, and one GS13-2) for a total of 223 hours each is $21,898.45, as shown in Table 2. Therefore, the total estimated cost to the Federal Government is $29,018.45.

Table 2. Estimated cost to the federal government including the cost for two researchers GS12 and GS13 to conduct and oversee data collection and participant incentives.

	Number of Participants	Duration of Experiment	Hourly Rate	Total cost
GS12-5	89	2.5	$47.22	$10,506.45
GS13-2	89	2.5	$51.20	$11,392.00
Incentive Payments	89	2.5	$30	$7120
Total				**$29,018.45**

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?

For this project, potential respondents will be identified through focused 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 and K for the phone screening script and recruitment flyer to be used during recruitment.

Refer to attached sampling plan for this information, which also highlights the consent process (Attachment B) 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

Please make sure all instruments, instructions, and scripts are submitted with the request.