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DEPARTMENT OF HEALTH AND HUMAN SERVICES

Centers for Disease Control and Prevention

[60Day-20-20PR; Docket No. CDC-2020-0074]

Proposed Data Collection Submitted for Public Comment and Recommendations

AGENCY: Centers for Disease Control and Prevention (CDC), Department of Health and Human Services (HHS).

ACTION: Notice with comment period.

SUMMARY: The Centers for Disease Control and Prevention (CDC), as part of its continuing effort to reduce public burden and maximize the utility of government information, invites the general public and other Federal agencies the opportunity to comment on a proposed and/or continuing information collection, as required by the Paperwork Reduction Act of 1995. This notice invites comment on a proposed information collection project titled Improving Safety of Human-Robot Interaction. The purpose of this data collection is to gather experimental information in the CDC Division of Safety Research Virtual Reality Laboratory on the effects of robot characteristics (e.g. size, movement speed, and movement trajectory) on human behavior, perceived safety, mental workload, and trust. This information will be used to improve the design and modeling of robots and robot functions to reduce human-robot collisions as a result of

improved robot navigation, reduced human workers' workload, and increased trust.

DATES: CDC must receive written comments on or before [INSERT DATE 60 DAYS AFTER PUBLICATION DATE IN THE FEDERAL REGISTER].

ADDRESSES: You may submit comments, identified by Docket No. CDC-2020-0074 by any of the following methods:

- Federal eRulemaking Portal: Regulations.gov. Follow the instructions for submitting comments.
- Mail: Jeffrey M. Zirger, Information Collection Review Office, Centers for Disease Control and Prevention, 1600 Clifton Road, N.E., MS-D74, Atlanta, Georgia 30329.

Instructions: All submissions received must include the agency name and Docket Number. CDC will post, without change, all relevant comments to Regulations.gov.

Please note: Submit all comments through the Federal eRulemaking portal (regulations.gov) or by U.S. mail to the address listed above.

FOR FURTHER INFORMATION CONTACT: To request more information on the proposed project or to obtain a copy of the information collection plan and instruments, contact Jeffrey M. Zirger, Information Collection Review Office, Centers for Disease Control and Prevention, 1600 Clifton Road, N.E., MS-D74, Atlanta, Georgia 30329; phone: 404-639-7570; E-mail: omb@cdc.gov.

SUPPLEMENTARY INFORMATION:

Under the Paperwork Reduction Act of 1995 (PRA) (44 U.S.C. 3501-3520), Federal agencies must obtain approval from the Office of Management and Budget (OMB) for each collection of information they conduct or sponsor. In addition, the PRA also requires Federal agencies to provide a 60-day notice in the Federal Register concerning each proposed collection of information, including each new proposed collection, each proposed extension of existing collection of information, and each reinstatement of previously approved information collection before submitting the collection to the OMB for approval. To comply with this requirement, we are publishing this notice of a proposed data collection as described below.

The OMB is particularly interested in comments that will help:

1. Evaluate whether the proposed collection of information is necessary for the proper performance of the functions of the agency, including whether the information will have practical utility;
2. Evaluate the accuracy of the agency's estimate of the burden of the proposed collection of information, including the validity of the methodology and assumptions used;

3. Enhance the quality, utility, and clarity of the information to be collected; and

4. Minimize the burden of the collection of information on those who are to respond, including through the use of appropriate automated, electronic, mechanical, or other technological collection techniques or other forms of information technology, e.g., permitting electronic submissions of responses.

5. Assess information collection costs.

Proposed Project

Improving Safety of Human-Robot Interaction – NEW – National Institute of Occupational Safety and Health (NIOSH), Centers for Disease Control and Prevention (CDC).

Background and Brief Description

The mission of the National Institute for Occupational Safety and Health (NIOSH) is to promote safety and health at work for all people through research and prevention. NIOSH has initiated a study among manufacturing workers to improve safety of workers that work in close proximity with robots. Study results will be used to improve safety standards and lead to better design guidelines for industrial robots.

Rapid growth of advanced collaborative and mobile robots warrants investigation on safe human-robot interaction for their potential injurious energy transmission from a robot to a

worker. Traditional safety measures for industrial robots, such as protective barriers, are no longer valid for the emerging collaborative and mobile robots. Physical contacts between human workers and robots are inevitable and even desired when they share a common workspace or work directly with each other under collaborative operations. Therefore, NIOSH is proposing a study to evaluate the effects of different characteristics of robots on human behaviors, perceived safety, workload, and trust.

The study will take advantage of virtual reality technology to simulate human-robot interaction during data collection sessions. Participants will conduct two related experiments that will involve performing simulated warehouse tasks (e.g. loading/unloading boxes from shelves) in a virtual reality laboratory. Participants will interact with a mobile robot in the first experiment and a collaborative robot arm in the second. They will wear glasses that will allow them to see virtual 3D images of the robots and other objects in the environment. During each experiment task, we will use motion capture technology to track the movement and location of the participants and the virtual robots. This will allow us to track movement speed and separation distance from the virtual robots. After each experiment task, we will administer three questionnaires to the participants that will ask them about their perceived safety, mental workload, and trust in the

robots. We will analyze how these measures change based on the virtual robot's operating speed, size, and movement trajectory.

Data collections will occur at the NIOSH facility in Morgantown, West Virginia. The target study population will be workers who currently work or had worked in the manufacturing industry, with varying job experiences. The burden table below accounts for 111 respondents over a three-year data collection period. Respondents will complete all forms only once, besides the Virtual Reality Sickness Questionnaire, which will be administered at the beginning and end of the data collection, and the three questionnaires (NASA Task Load Index, Perceived Safety Questionnaire, and Robot Trust Questionnaire), which will be administered after each of the 63 combined experiment trials. The total estimated burden hours are 217. There are no costs to the respondents other than their time.

Estimated Annualized Burden Hours

Type of Respondents	Form Name	Number of Respondents	Number of Responses per Respondent	Average Burden per Response (in hours)	Total Burden (in hours)
	Simulator Sickness Susceptibility Questionnaire	37	1	1/60	1
	Consent Form	37	1	10/60	6
	Participant Data Collection	37	1	1/60	1

Manufacturing Workers	Form				
	Virtual Reality Sickness Questionnaire	37	2	1/60	1
	Robot Experience Questionnaire	37	1	6/60	4
	Actual Experiment 1 – Mobile Robot	37	1	1.16	43
	Actual Experiment 2 – Collaborative Robot	37	1	1.16	43
	NASA Task Load Index	37	63	1/60	39
	Perceived Safety Questionnaire	37	63	1/60	39
	Robot Trust Questionnaire	37	63	1/60	39
Total					217

Jeffrey M. Zirger,

Lead,

Information Collection Review Office,

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