

# **A novel intervention method to promote workers' safety awareness and mental health during human-robot collaboration**

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# Challenges in worker safety

UNITED STATES DEPARTMENT OF LABOR

Occupational Safety and Health Administration

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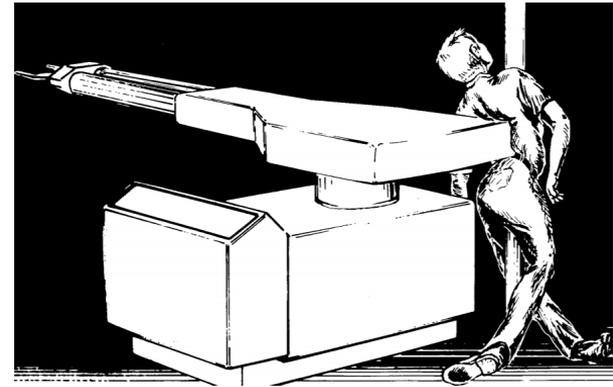
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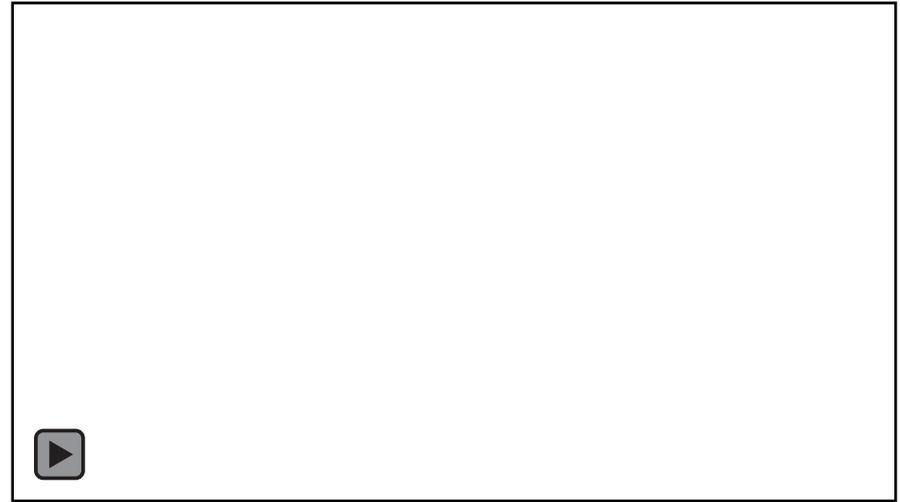
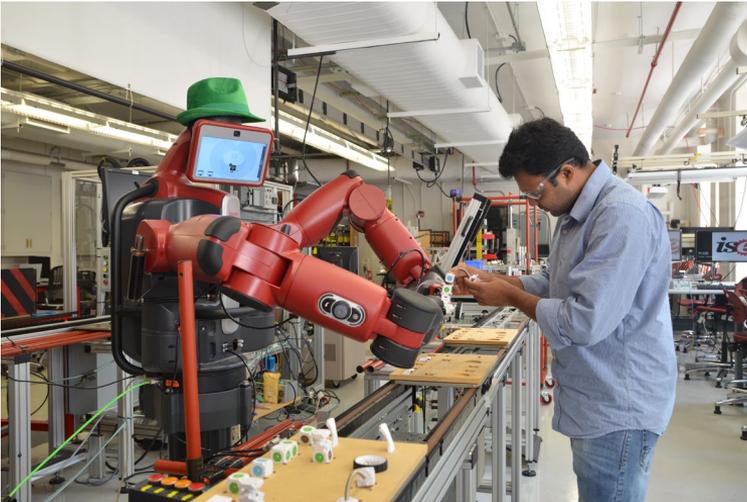
#	Summary Nr	Event Date	Report ID	Fat	SIC	Event Description
<input type="checkbox"/>	1	120779.01	10/16/2019	0418100	X	Employee Is Struck By Rejected Fiber Concrete Board And Crus
<input type="checkbox"/>	2	114999.01	04/03/2019	0355111		Employee Amputates Finger While Removing Tire From Rim
<input type="checkbox"/>	3	113594.01	02/11/2019	1032500		Employee Is Pinned Against Heated Mold By Robotic Arm And Su
<input type="checkbox"/>	4	112475.01	01/10/2019	0454712	X	Employee Is Crushed And Killed By Wind-Up Machine
<input type="checkbox"/>	5	101894.01	12/12/2017	0418600		Worker Sustains Fractured Hip When Struck By Robot
<input type="checkbox"/>	6	105315.01	11/27/2017	0214500		Employee Is Injured When Struck By 100 Pound Bag Of Flour
<input type="checkbox"/>	7	96664.015	01/17/2017	0950644		Employee Is Struck By Robot Arm And Sustains Fractured Stern
<input type="checkbox"/>	8	200627032	06/16/2013	0454712	X 3711	Employee Is Struck By Axis Arm< Later Dies
<input type="checkbox"/>	9	202570313	03/07/2013	0452110	X 3714	Maintenance Worker Is Struck And Killed By Robot
<input type="checkbox"/>	10	201392776	12/15/2012	0552652	X 3465	Robot Crushes And Kills Worker Inside Robot Work Cell



An operator was pinned between the back end of an die-cast robot and a steel safety pole.

# Human-robot collaboration

- Isolating workers from Robot is not an option



# Safety awareness / Mental stress

- Workers' proactive safety awareness refers to the situation awareness emphasizing workers' perception and projection of the safety-related elements
- Workers' safety is not limited to physical collision, but also extends to mental health. As workers treat co-robots as social entities, appearances and actions of co-robots affect a worker's mental stress

# Research aims

- 1. To understand the profile of workers' safety awareness and mental stress in response to co-robot appearance and actions.
- 2. To develop and evaluate an intervention method to promote workers' safety awareness and mental health through co-robot actions.

