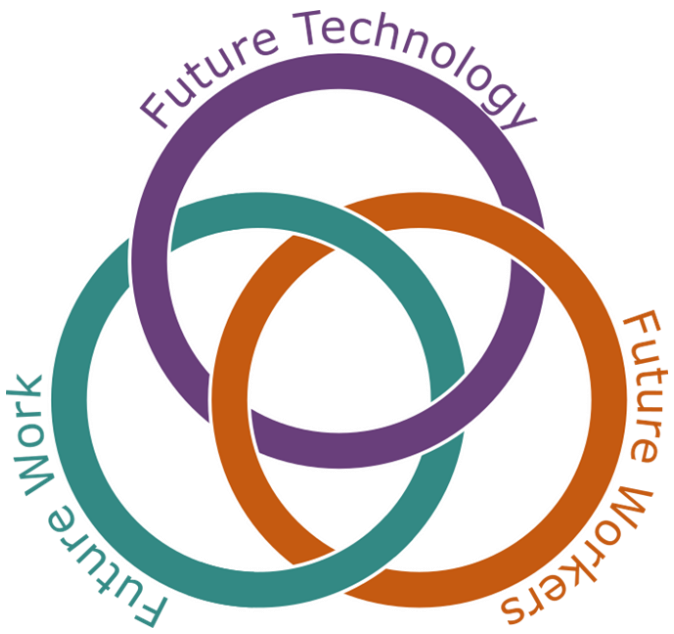
National Science Foundation



Panel 3

Technology Acceptance, Workforce Preparation, Training, and Skilling

2026398: FW-HTF-P: Addressing the Wearable Technology Acceptance Gap for Industrial Workers Performing Repetitive Motion Work

PI: Reuben Burch (Mississippi State Univ.; burch@ise.msstate.edu)

Motivation

ATHLETE ENGINEERING AT MSU

Methods

Focus groups (n=14): Employers; HR Managers; Safety Personnel; Employees; Workforce Educators and Students; Workforce Strategists; Tech Developers

MISSISSIPPI STATE UNIVERSITY

Results

"Technology generates issues as well, especially on the front end, it takes quite a bit of support to get that value out of it. You can't just implement it, and it's all positive."

"It's going to take certain folks, you know, they're going to need to see some hard evidence that something works."

"There's always some level of distrust."

Acceptance Factor	Positive	Negative	Total
Attitude Toward Innovation	57	51	108
Learnability/Integration	17	35	52
Attitude Toward Change	9	16	25
Usefulness	20	3	23
Convenience/Efficiency	10	5	15
Need for Innovation	13	2	15
Cost	5	9	14
Data	6	6	12
Ease of Use/Usability	2	10	12
Standardization	3	8	11
Legal	0	2	2

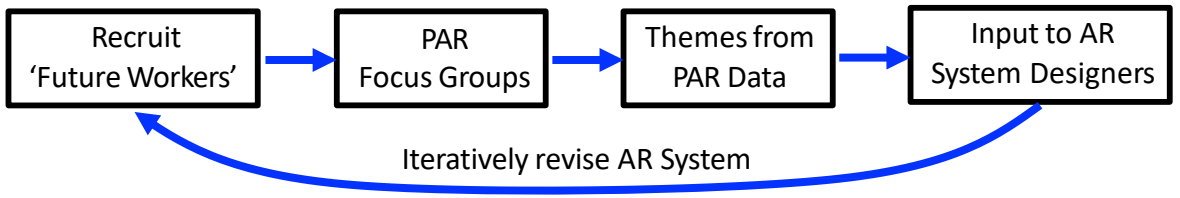
Participatory Design Process for Co-Creating Augmented Reality Based Education and Training Systems, #2128950

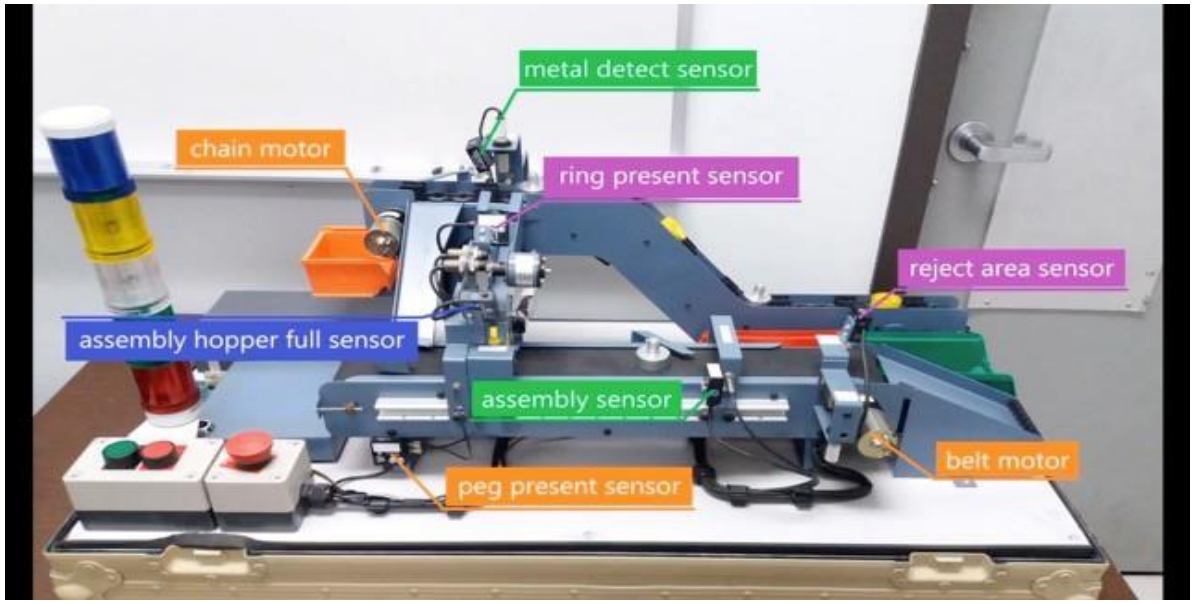
Shivakumar Sastry (U. Akron), Kavitha Chandra (UMass, Lowell) and Maria Brunette (OSU), Presenter: Shiva Sastry, Email: ssastry@uakron.edu

The Need: Emerging technology advances, such as the Electrification of Vehicles, demand creative and effective approaches for reskilling the industry workforce by harnessing their current skills and expertise and providing new digital skills.

The Opportunity: While AR Systems have matured in their capabilities, creating effective AR content remains challenging. This investigation explores how human factors that provide measurable outcomes of the learning and training experience can be integrated to create AR content that enables inter-generational communication and knowledge sharing among future workers with diverse backgrounds.

Our Approach: Utilize a prototype AR system to conduct Participatory Action Research (PAR) Focus Groups with representative 'future workers'. Extract themes from the PAR data and revise AR System iteratively with input from key stakeholders (Delphi Method) drawn from manufacturing, social-sciences, education and engineering.





Bach Tran, Ph.D. Student at UA demonstrating our AR System. The conveyor system is a real, physical, system and all the labels are virtual artifacts. This immersive view represents a future worker's experience using an AR device.

NSF FW-HTF-R #2128954: Preparing hospitality workers and workplaces for the future of automation

Jodi Forlizzi, Carnegie Mellon University HCII, forlizzi@cs.cmu.edu

Context:

- Automation in the hospitality industry continues to rise dramatically
- The pandemic has resulted in increased automation; trend is expected to continue after the pandemic subsides
- Workers who are affected are largely female, lower SES, and underrepresented groups

Approach:

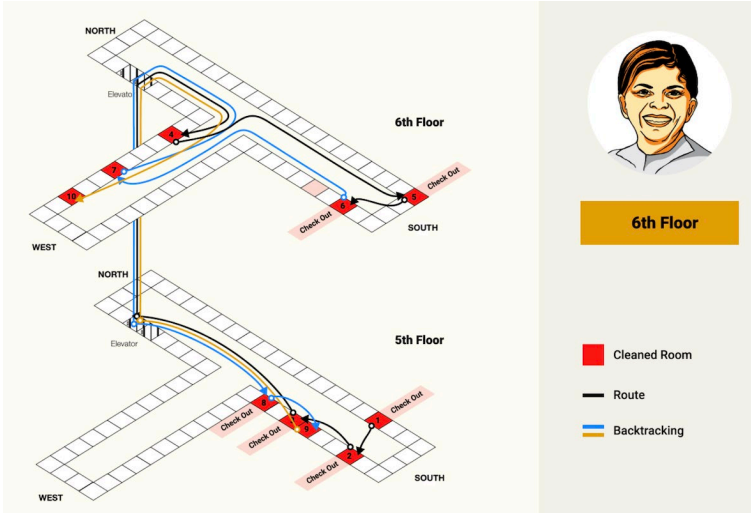
- Our work seeks to address the lack of worker voice on the impact of future automation in the hospitality industry
- We seek to make suggestions for future work: job quality, job satisfaction, training materials, and career progression
- We are partnering with UNITE HERE, the largest hospitality union in the US

Process:

- Understand the current state of union hospitality workers, hospitality work, and automation technology.
- Iterative co-design of technology deployment models
- Identify jobs skills, workforce needs, and training materials to prepare management and workers to succeed in an increasingly technologically enhanced workplace
- Evaluate outcomes to understand how they impact the future of work

Work to date:

- Workshops with UNITE HERE members
- Focused on algorithmic managers for housekeeping and automated bartenders for casino staff



- Revealed that they value providing face-to-face service
- Evidence of labor shifting: created more labor, shifted work, reduced time for the social work that is prized in hospitality service
- Frustration at lack of training on new systems
- Felt loss of agency
- Had ideas for how to better design and implement new systems
- Ongoing meetings with developer of hospitality applications for housekeeping

Next steps:

- Select matched hotels for baseline data collection
- Similar characteristics; will differ in whether properties adopt automation
- Mixed-method, sequential research
- Deploying large-scale survey
- Conducting observations of work on hotel properties
- Conducting user enactments with demonstrational prototypes of future worker-driven technology systems
- Exploring/prototyping ways to create new roles and new training systems

Co-investigators:

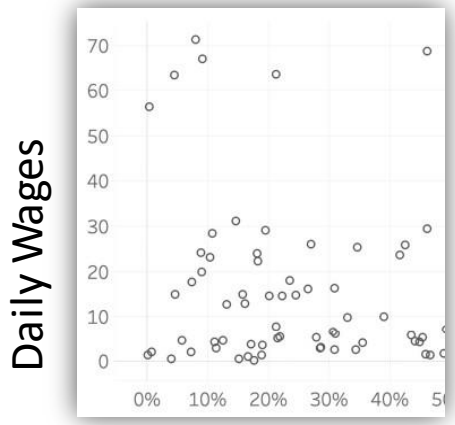
- Sarah Fox and Chimmay Kulkarni, CMU
- Ben Begleiter, Ezra Awumey; Edward Wytkind, UNITE HERE
- Ellen Mutari and Deborah M. Figart, Stockton University
- Christine Riordan, University of Illinois
- Hye Jin Rho, Michigan State University
- Elizabeth Stringam, New Mexico State University

#1928528:FW-HTF-RL:Collaborative Research: Enabling Marginalized Rural and Urban Digital Workers to Collaborate with AI to Learn Skills, Increase Wages, and Access Creative Work

Dr. Bigham, Dr. Callison-Burch, Dr. Kittur, Dr. Hanrahan, **Dr. Savage**

Objective: researching A.I. tools to best support marginalized workers to: (i) transition to online work and opportunities; (ii) augment the number of workers rather than displacing them; (iii) develop and foster their digital skills and creativity.

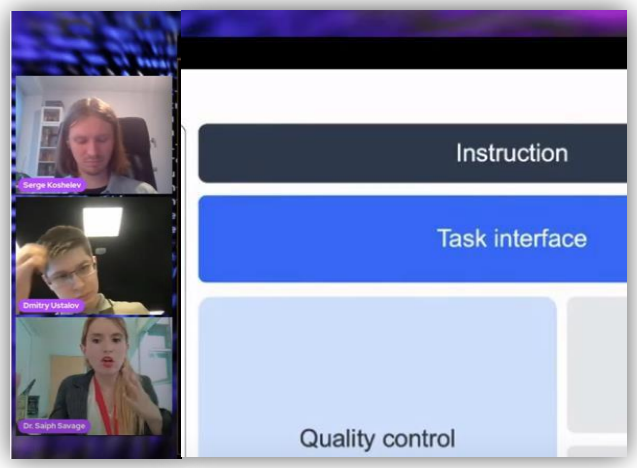
- Designed A.I. tools to augment workers through best practices.
- Developed A.I. tools that empower workers by auditing digital labor markets to visibilize injustices at work.



Our research:

i) Has augmented workers to:
- Earn higher wages.
- Raise awareness of the invisible labor workers are forced to do.

ii) Has connected with policy makers to understand labor conditions in order to design and develop better policies for marginalized workers.



Our research:
- Has generated public computational infrastructure to augment workers´ access to fairer workspaces.
- Has developed courses for students on the design of A.I. tools to empower workers.

2041215: Preparing the Future Workforce for the Era of Automated VEhicles (WEAVE)

Shelia R. Cotten[1,*] (PI), Elizabeth A. Mack[2], Chu-Hsiang Chang[2], J. Kevin Ford[2], Peter Savolainen[2], John Verboncoeur[2], Troy Hale[2], Amy M. Schuster[1], Shubham Agrawal[1], Sicheng Wang[2]

[1] Clemson University, [2] Michigan State University, *230 Kappa St., Clemson, SC 29634(scotten@clemson.edu)

OBJECTIVES

- Changing nature of driving jobs and knowledge, skills, & abilities (KSA) requirements in response to automated vehicles (AVs)
- Workers' willingness and ability to adapt to AVs
- Anticipated downstream impacts of AVs
- Impacts of COVID-19 on transportation jobs and AV perceptions

MAJOR ACTIVITIES

Focus groups

Trucking
- Drivers: 12
- Supervisors: 9
- Managers: 12

Ride-hailing & delivery
- Ride-hailing: 2
- Delivery: 4
- Both: 11

Taxi (recruiting)
- Drivers: 3
- Dispatchers: 0
- Managers: 0

Data Collection & Analysis

Newly collected data
- Survey of truck drivers' preferences for alternative occupations
- Social media posts (Twitter)

Analyzing existing data
- O*NET
- Occupational Employment and Wage Statistics
- Current Population Survey
- American Community Survey
- State of the State Survey (MSU)

Ongoing activities
- Survey of industry perceptions of AV adoption & impacts

RESEARCH AREAS

AV Adoption & Impacts

- AV perceptions & political ideology
- Barriers & facilitators to AV deployment
- AV impacts on occupations
- Driver reactions to AVs

Occupations

- KSA mapping
- Occupation clustering
- Alternative occupations
- Occupation data downscaling
- Reskilling the driving workforce
- Technology and occupational aging & mobility

COVID-19 Impacts

- Trucking industry
- Gig drivers
- Transportation employment

KEY FINDINGS

- Trucking industry disrupted by COVID-19 and companies constantly adapted to reduce costs and accommodate employees' concerns
- Workers in the transportation industry were more likely to be unemployed than non-transportation industries during COVID-19
- Truck drivers expressed interest in alternative occupations identified using both shared skills and work/industry job search methods
- Most job changes due to technological change will occur in low-skill, low-wage occupational groups
- Positive public perception of truck drivers and gig drivers increased on Twitter during COVID-19
- Political ideology predicts individuals' intent to adopt AVs

RESEARCH OUTPUT

- 4 peer-reviewed journal articles
- 2 manuscripts under review
- 4 manuscripts in process
- 9 conference presentations or special sessions
- 3 upcoming conference presentations

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