Panel 4:
Knowledge; learning; learning systems; creative service workers, designers and educators

- Augmented Cognition for Teaching: Transforming Teacher Work with Intelligent Cognitive Assistants
- Augmenting Social Media Content Moderation
- Enabling Marginalized Rural and Urban Digital Workers to Collaborate with AI to Learn Skills, Increase Wages, and Access Creative Work
- Intelligent Social Network Interventions to Augment Human Cognition for Interdisciplinary Interactions in Project Teams
- Neurodiversity in Tech: Using Interactive Decision Theory and Augmented Reality to Enable Employment for Adults with Autism Spectrum Disorder
- The future of classroom work: Automated Teaching Assistants
AUGMENTED COGNITION FOR TEACHING: TRANSFORMING TEACHER WORK WITH INTELLIGENT COGNITIVE ASSISTANTS

Krista Glazewski, Cindy E. Hmelo-Silver, Tom Brush
Indiana University
Bradford Mott, James Lester
North Carolina State University

The project has two central thrusts:

1. Design and develop I-ACT cognitive assistants to support K-12 STEM teachers for PBL implementation and orchestration public school classrooms.
2. Investigate how I-ACT cognitive assistants support teacher practices, performance, and teacher quality of work-life.

Current progress with technology:
- Develop classroom instrumentation pathways.
- Refine the hardware and software tools for gathering classroom-based multichannel data streams.
- Gather multichannel data for multimodal learning analytics.

Current progress with supporting the workforce using the Orchestration Assistant:
- Provides real-time, actionable data to teachers
- Automates some scaffolds, freeing up the teacher to offer more targeted and sophisticated feedback to learners.

Current progress with improving teacher skills:
- Conduct co-design focus groups and interviews with teachers.
- I-ACT fellows teacher PD

Teachers as professionals are empowered to:
- Engage with the “unknowns” of problem-based and inquiry learning
- Make decisions based on student actions
- Engage in sophisticated orchestrations scaffolding that may have previously been invisible or overwhelming.
FW-HTF-RM: Collaborative Research: Augmenting Social Media Content Moderation (1928627, 1928286, 1928434)
PI(s): Donghee Yvette Wohn, NJIT, wohn@njit.edu
Sarah T. Roberts, UCLA, sarah.roberts@ucla.edu
Libby Hemphill UMich, libbyh@umich.edu

1. Improve quality of worklife for content moderators
2. Understand moderator workflow => Augment content moderators’ capabilities

Progress
- Training of 7 graduate, 4 undergraduate students (Literature review, qualitative and quantitative research methods, visualization)
- Comprehensive review of state-of-the-art in human-AI moderation tools
- 30 hours of interviews with moderation industry specialists
- Surveying moderators about reasons for quitting

Progress (continued)
- 20 interviews with volunteer moderators on their decision-making processes / remote observations of their work
- Experimenting interventions to alleviate moderator fatigue/stress with freelance moderators
- Developing a model of live information visualization
- Historical analysis of moderation from perspective of assistive technology

Outreach
- Formulating best practices for commercial content moderation teams
- Direct engagement with content moderation industry partners

[Graph showing percent of moderators who felt emotionally drained]
This project focuses on researching A.I. tools to best support marginalized workers to: (i) transition to online work; (ii) augment workers instead of displacing them; (iii) develop their skills and creativity.

We have developed A.I. tools that live within digital labor platforms and guide:
• Novice online workers on how to earn higher wages.
• Employers on how to evaluate gig workers fairly.

Our research has helped:
• Power digital labor platforms with workers who earn higher wages.
• Drive employers to be fairer with gig workers.
• Start to map the needs of local industry and large technology companies with respect to online rural workers.

Our research has helped:
• Better understand the challenges faced by U.S. online workers in urban and rural settings
• Create tools for empowering novice workers to earn higher wages
• Develop courses for rural adults to develop their digital skills
  • Rural adults have completed several tutorials in rural libraries
#192878 Intelligent Social Network Interventions to Augment Human Cognition for Bolstered Interdisciplinary Interactions in Project Teams

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- Dr. Sinem Mollaoglu: Construction Management, sinemm@msu.edu, 517-353-3252
- Dr. Kenneth Frank: Education, kenfrank@msu.edu, 517-355-9567
- Dr. Jiliang Tang: Computer Science and Engineering, tangjili@msu.edu
- Dr. Richard DeShon: Psychology, deshon@msu.edu, 517-353-4624
- Dr. Hanzhe Zhang: Economics, hanzhe@msu.edu, 517-355-467

**Goal:** To augment human cognition and functioning of multiteam systems via machine learning enabled social network interventions to help individuals develop skills for future of work.

Survey, archival, emails, and meeting data:
- 17 student teams across domains (4-14 weeks)
- 2 infrastructure projects teams (1-3 years)

**Progress addressing Future Technology**

**Goal:** Automated extraction of project team communications in meetings.
- 2.4K training data labels from a mix of student and industry teams
- Individuals’ give info/ ask info/ other
- 87% accuracy established
- Robust to ASR errors and bias of data annotators

**Progress addressing Future Work**

**Goal:** Via the social network interventions, help teams improve performance.
- Developed new metrics to predict information bottlenecks in projects.
- Operationalized longitudinal surveys for team & project performance

**Progress addressing Future Workers**

**Goal:** Via the social network interventions, help individuals develop skills for complex project teams.
- Developed and operationalized (pre/post surveys):
  - Teamwork skills
  - Network knowledge
  - Individual utility

Captured transitions from in-person to virtual team during the pandemic.
# 1928604 FW-HTF-RL: Neurodiversity in tech: using interactive decision theory and augmented reality to enable employment for adults with ASD
Leanne Chukoskie and Pamela Cosman, UC San Diego
lchukoskie@eng.ucsd.edu  pcosman@eng.ucsd.edu

• Build AR/VR interpersonal communication, writing, and soft skills coaching tools
• Build a supportive technology internship model for neurodiverse young adults.
• Study economic and ethical questions that arise from these technologies.

95% of the Neurodiverse Interns were satisfied or very satisfied with their 2020 internship experience. Neurodiverseinternship.com
Goal: **Let teachers teach** by using AI to interpret speech, position and log data and detect routine non-optimal classroom behavior (see middle panel below) and handle it by messaging students or escalating to teacher only when necessary.

ML & DL-based collaboration detectors successful in lab; now moving to middle-school classrooms. They distinguish work together vs. work separately vs. only 1 working.

<table>
<thead>
<tr>
<th>Task</th>
<th>Kappa</th>
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<tbody>
<tr>
<td>Log data</td>
<td>0.78</td>
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<tr>
<td>manual segments</td>
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<tr>
<td>content removal</td>
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<tr>
<td>Trained on Move</td>
<td>0.46</td>
</tr>
<tr>
<td>Trained on Write</td>
<td>0.25</td>
</tr>
</tbody>
</table>

Move = collaborative card moving activity  
Write = collaborative writing activity

Automated teaching assistant tasks:
- Remind a group to collaborate: Everyone works together.
- Remind students to explain their reasoning to each other.
- If students can’t get started on a task, help them understand the instructions.
- If students work fast and sloppily, ask them to work more carefully.
- If students finish early, ask them to check their work.
- If their work is error-free, assign them new work.

Teacher will review a class session:

& view analyses of student work: