

Just-In-Time AR-Based Learning in the Advanced Manufacturing Context

BRYCE JOE-KUN THAM

DR. WALT SCACCHI (FACULTY MENTOR)

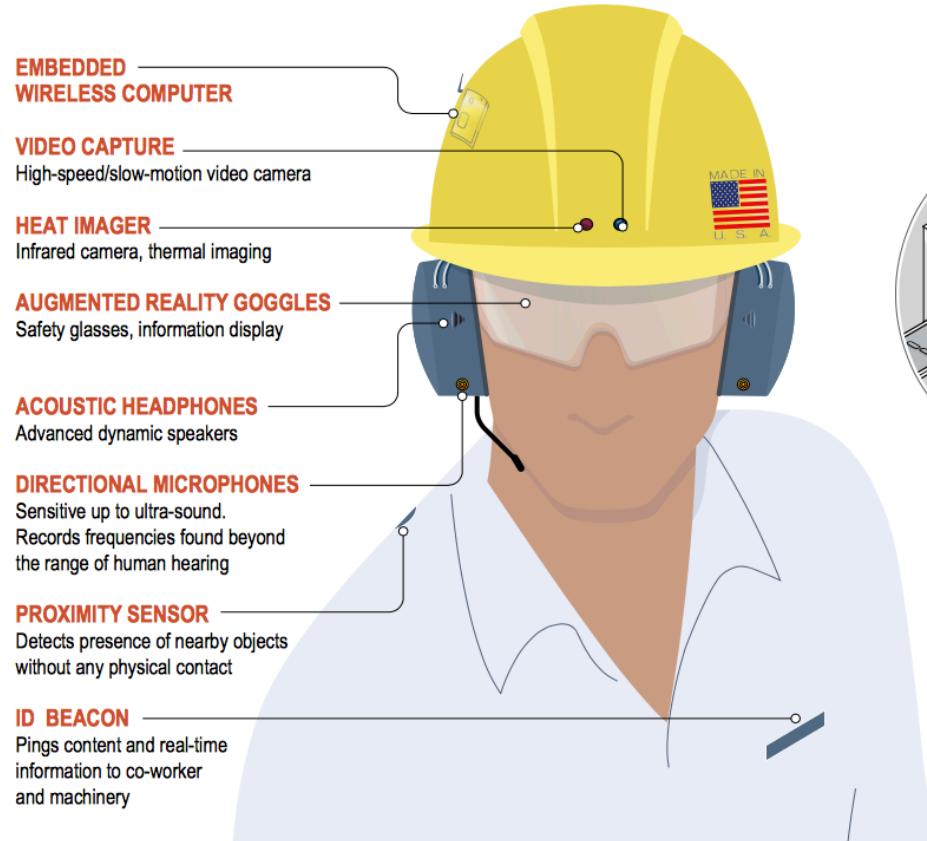
Overview

- Use computer game and **augmented reality (AR)** technologies to enable smart workers to work more efficiently.
- Utilize AR-based game techniques so smart workers can integrate **just-in-time training** into the manufacturing workflow.

Motivation

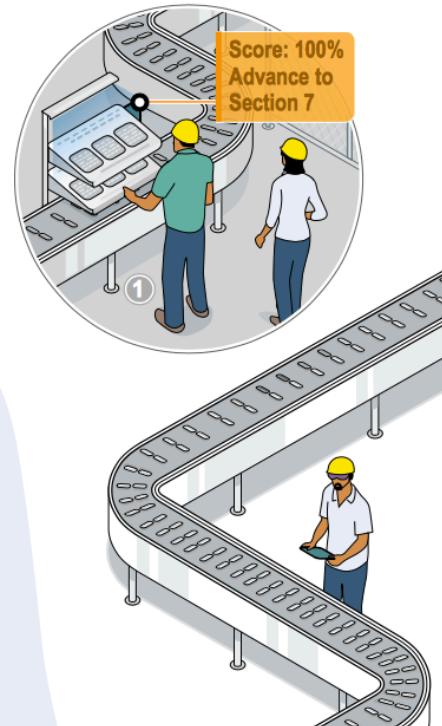
- Improve energy efficiency and productivity and reduce wasted resources and mistakes.
- Enable manufacturing workers to continuously improve manufacturing processes and work practices.
- Help make manufacturing work more fun and learning-oriented.

The SMART worker



SIMULATOR TRAINING

Instructional environment with sensors and controls that simulate the actual work station for training scenarios. System provides low-cost, safe, controlled situation-awareness training and more accurately assesses progress.



Goal

- To design and develop a prototype for a head-mounted AR application demonstrates just-in-time augmented learning for use in the assembly line manufacturing context.

Design

- Computer games can provide compelling models and simulations of complex systems.
- **Manufacturing game systems** provide safe, low-cost experiential learning of manufacturing systems, processes, and work practices.
- **AR games for smart workers** utilize low-cost AR compatible devices and techniques to deliver playful training and compelling user experience.

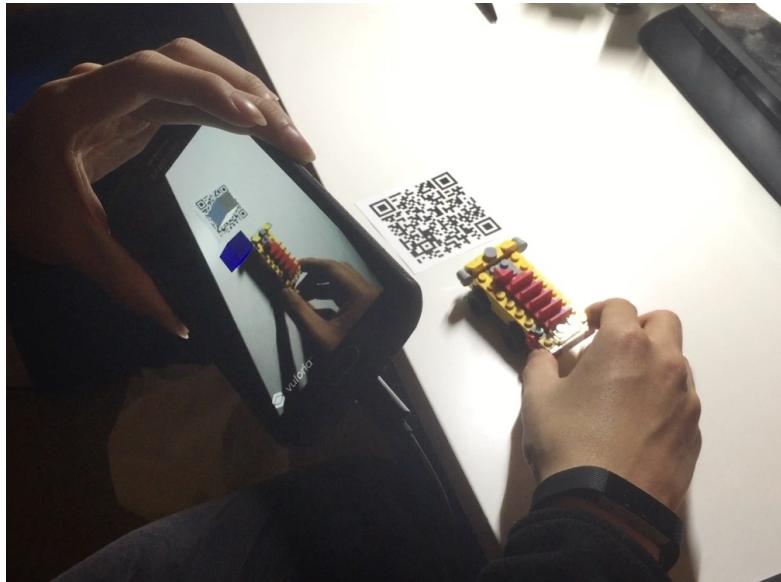
Game-Based Systems

Some design decisions were inspired by popular video games:

- Contraption Maker (2014)
- Minecraft (2011)
- Infinifactory (2015)
- Fallout 4: Contraptions Workshop (2016)



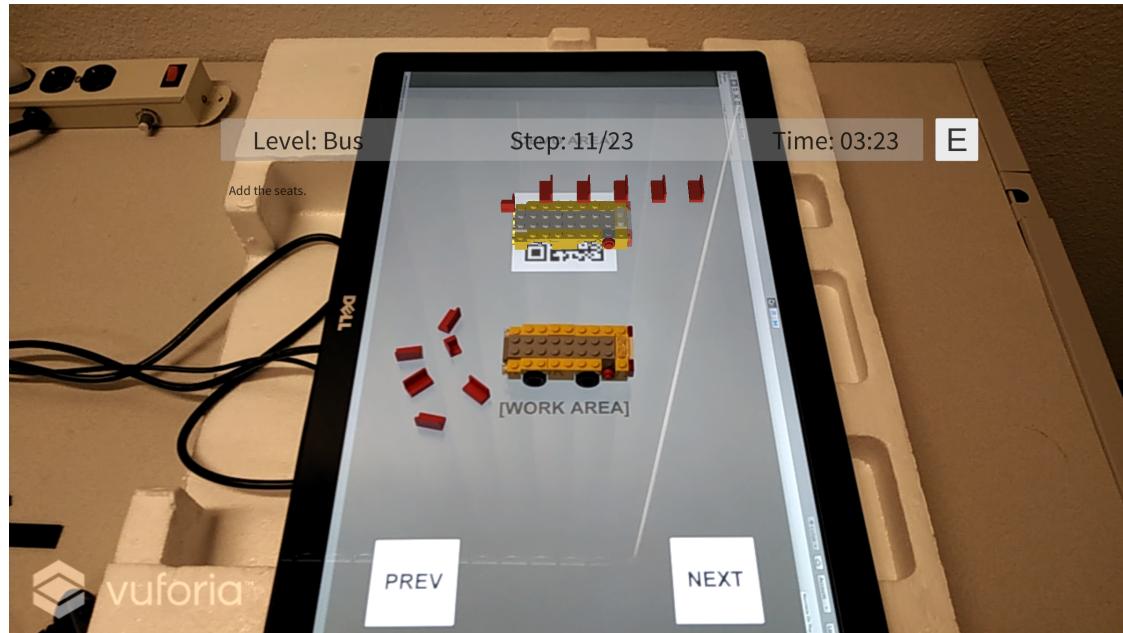
Marker-Based AR



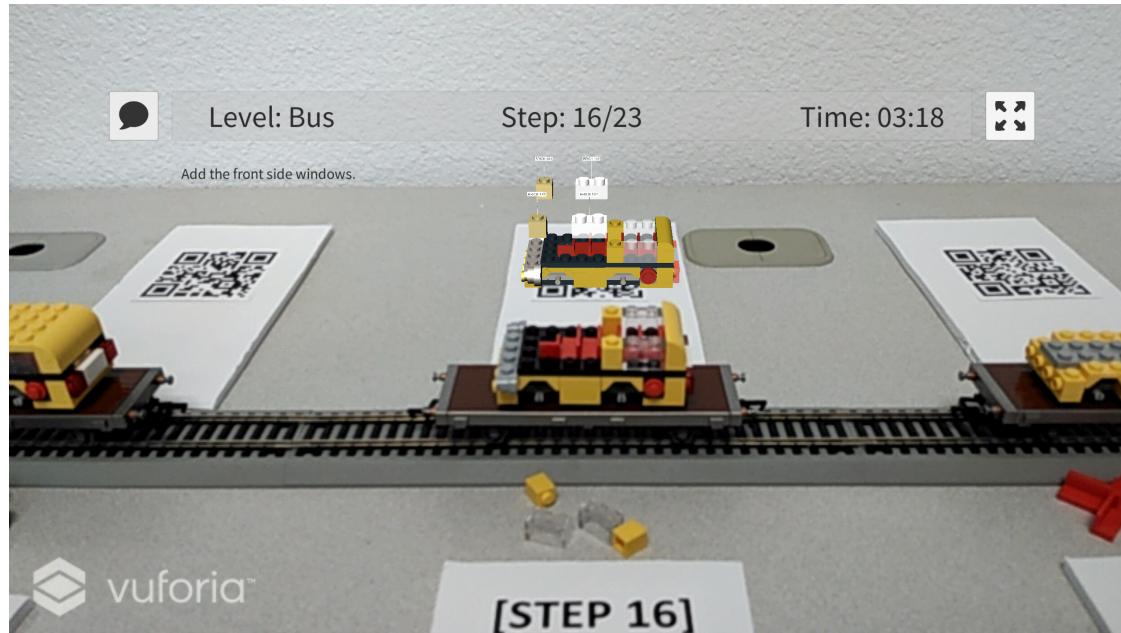
Most of today's augmented reality applications use the smart device as an interface.

Typically, the smart device uses its back-facing camera to locate and identify a 2D marker in the real world, and superimposes a virtual image on the device's screen over the video captured by the camera.

Virtual Prototype



Physical Prototype





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