



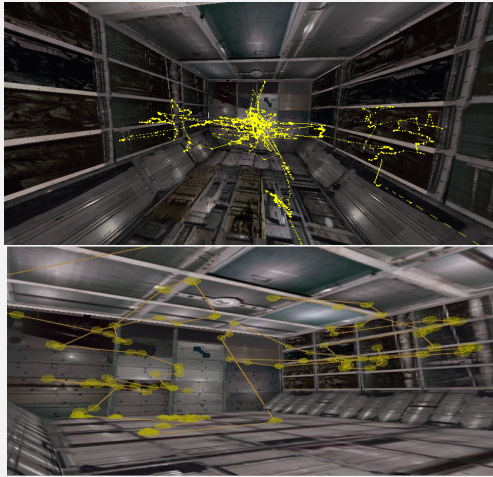
CLEMSON UNIVERSITY
**Center for Workforce
Development**



Lessons Learned from the Design & Development of VR Applications for Workforce Development

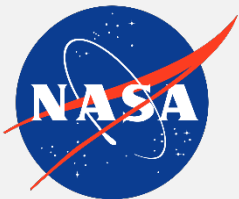
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Two decades of VR development



Virtual Reality
Technology for Aircraft
Visual Inspection

1999



Automated System of Self-
Instruction for Specialized
Training (ASSIST)

2003



Actual Cargo Bay



Virtual Cargo Bay

Virtual Environment for Visual Search Training

2004

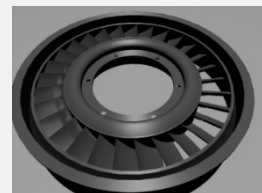


- CUCWD
- 2019 CCC Workshop

Two decades of VR development



Actual Turbine
Blades



Virtual Turbine
Blades



Technician
performing engine
inspection with VR
borescope using
haptic device

Virtual Reality for NDT
Training



Regional Center for Automotive and Aviation Training



Trade Adjustment
Assistance Community
College Career Training

2007

2009

2011 -2015



Two decades of VR development

COORDINATION NETWORK

Create a collective, end-to-end innovation ecosystem to lower barriers for two-year colleges to embrace VR/AR based technology innovations to enhance personalized learning.

MANUFACTURING ENGINEERING EDUCATION PROGRAM

Establish VR/AR-based programs to better position the next-generation manufacturing workforce to produce military systems and components that assure technological superiority for the DoD



2017



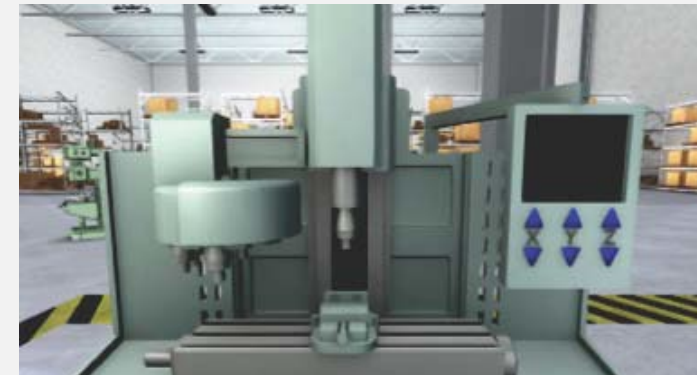
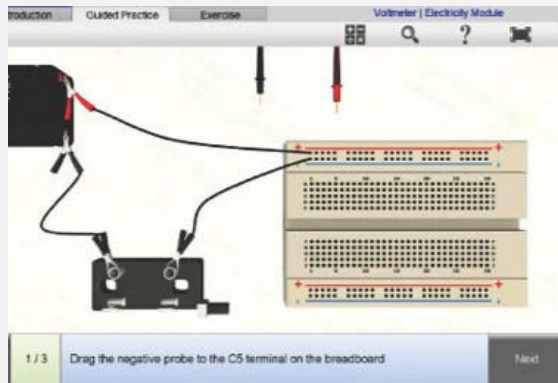
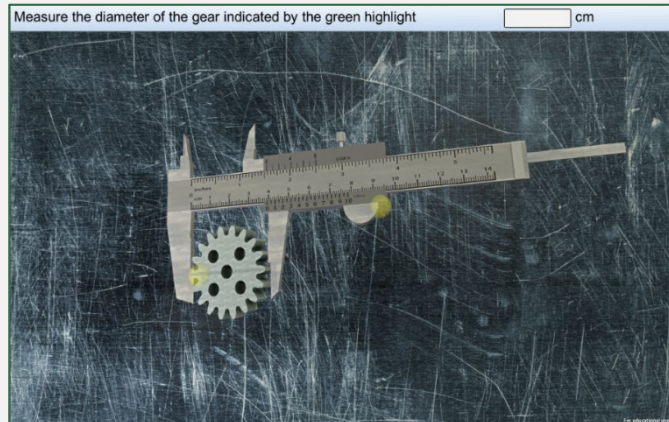
2018



2006 - 2019

VR DEVELOPMENT FOR
INDUSTRY

A subset of simulations created



~120
SIMULATIONS

Lessons Learned: Immersive experience

1

VR/AR environments offer a unique ability to immerse learners in environments they are studying.

Lessons Learned: Enhanced learning outcomes

2

Exciting and efficient tools which can provide positive learning outcomes, increase learner motivation, teach 21st century job skills, and improve the learning.

Lessons Learned: Systematic development process

3

A systematic content development process integrating user-centered design process, system analysis techniques, UDL principles and relevant frameworks from educational literature

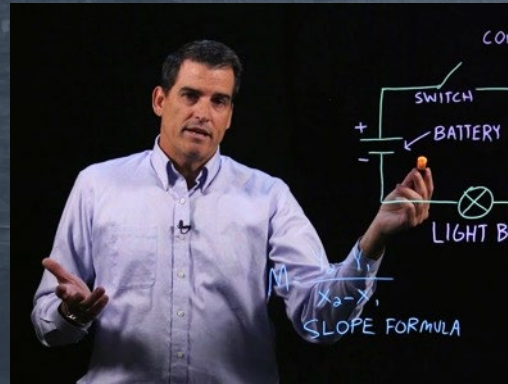
Lessons Learned: Integration with other training material

4



Virtual Reality

Simulations serve as online labs to engage with material



Video Lecture

Engaging for visual and auditory learners



Open Text

Robust textbooks for all courses, ebooks available on request.



Assessments

Reinforcement of learning materials through immediate feedback

Challenges: Device agnosticism

1

Compatibility with operating systems, browsers and different types of devices, including notebooks, tablet PCs and smartphones.

Challenges: Effective system-level integration

2

- Effective integration capabilities with other systems (talent management, training, compliance...)
- Support for blended learning approaches

Challenges: Collaborative VR for training

3

Need for methods to provide training when
trainers and trainees are geographically
separated

Challenges: Assessments, reporting and tracking

4

- Ability to create and modify assessments with ease
- Validated methods to assess a trainee's performance

Challenges: ADA compatibility, Usability, Security

5

- Need to make VR/AR accessible to everyone
- Create/Borrow/Update the guidelines from HCI literature



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Questions?

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