ICSC15

Canadian Society for Civil Engineering

ENHANCING THE CONSTRUCTION SAFETY TRAINING BY USING VIRTUAL ENVIRONMENTS: V-SAFE

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BOĞAZİÇİ ÜNİVERSİTESİ 1863

Outline

- ✓ Motivation
- ✓ Background
- ✓ Development of the V-SAFE
- ✓ Alpha Study
- ✓ Contributions
- ✓ Conclusion

Motivation

United States

800 fatal accidents in 2013 (U.S. Bureau of Labor, 2014)

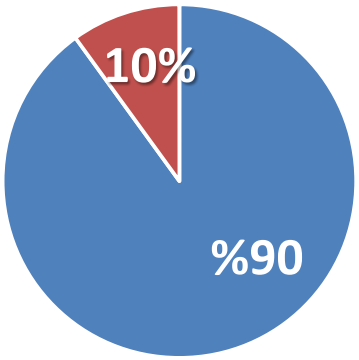
Canada

558 fatal accidents between 2004 and 2013 (WSIB, 2013)

European Union

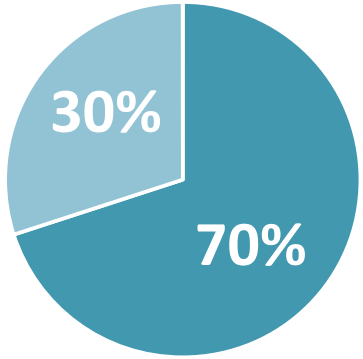
Approximately 3,800 fatal injuries occurred in 27 EU countries in 2012 (Eurostat, 2013).

Motivation



Preventable

Not Preventable

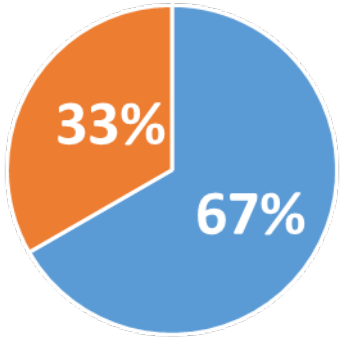


Other

Poor Safety Management Action

Coleman (1991)

33% of Risks could not be identified by the workers



Carter and Smith (2006)

Training Methods

Least Engaging

- Information Delivery Systems
- Books, Lectures
- Videos, Photos



Moderately Engaging

- Information Delivery Systems + Feedback
- Questionnaires
- Interviews


Highly Engaging

- Knowledge & Information Transfer
- Behavior Modeling
- Active Hands-On Training
- Feedback

"Relative effectiveness of worker safety and health training methods" by Burke et al. 2006

Research Objective

Alternative Training Method???

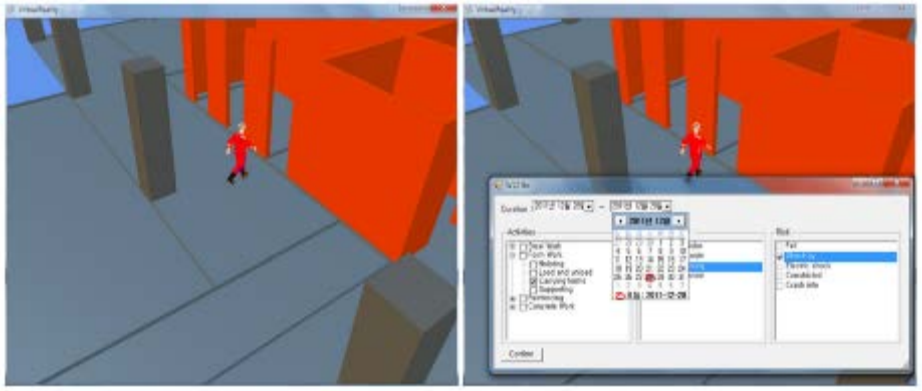
Knowledge and Information Transfer

Behavior Modeling

Active Hands-On Training

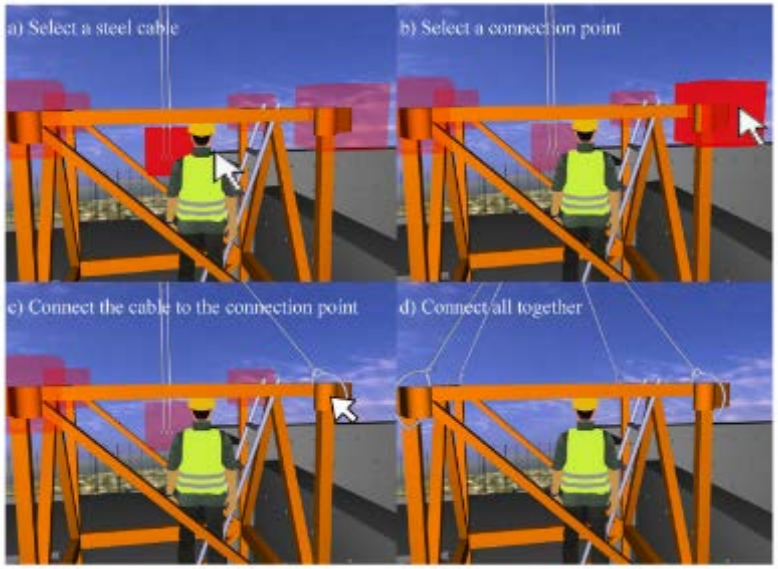
Feedback

Using Virtual Environments



"A framework for construction safety management and visualization system" Park, C-S., and Kim, H-J. (2013)

Microsoft XNA Game Studio 4.0



"Using game technologies to improve the safety of construction plant operations" Guo et al. (2012)

3DVIA Virtools

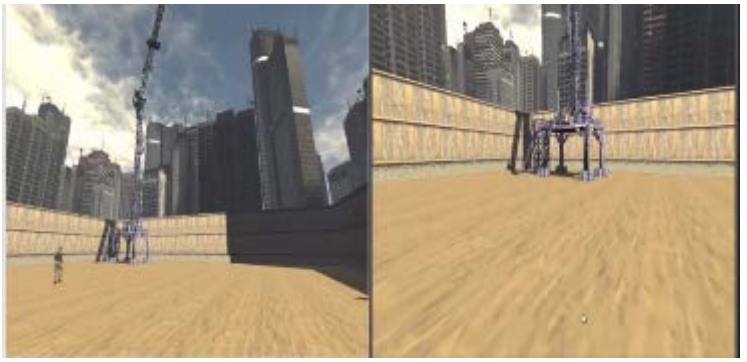
V-SAFE

- Virtual Safety Analysis For Engineering applications (V-SAFE) is a virtual reality based safety training tool.

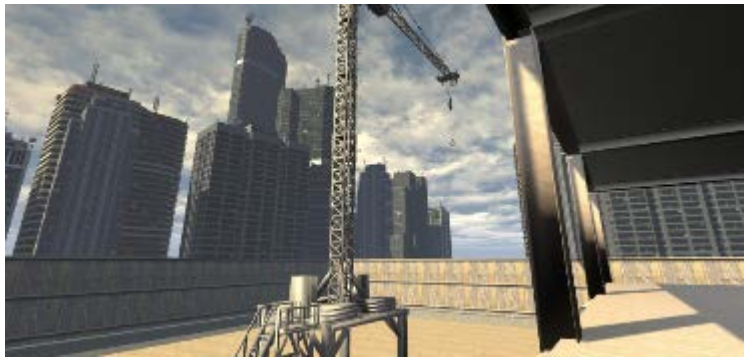
- V-SAFE is based on the utilization of the Unreal Game Engine by virtue of the Unreal Software Development Kit.

V-SAFE: Features

Crane Simulation



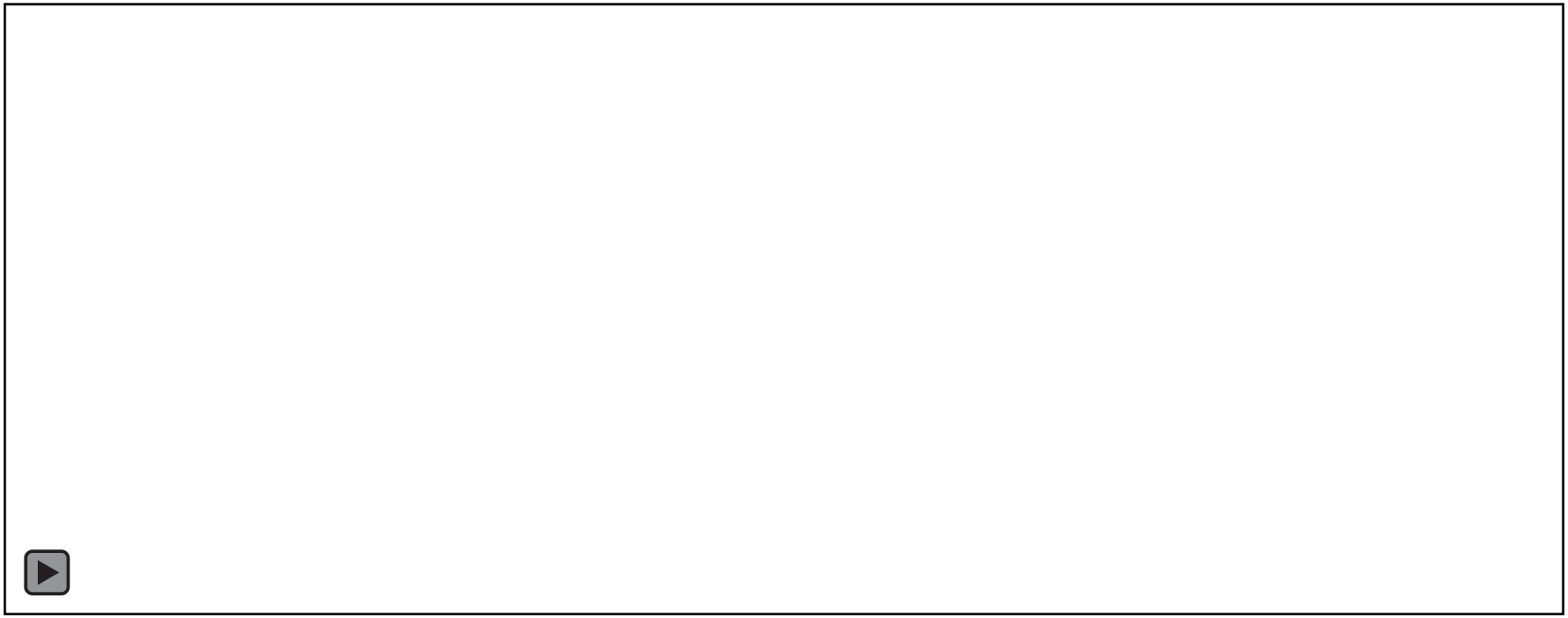
Multiuser Interaction



Surrounding Environment

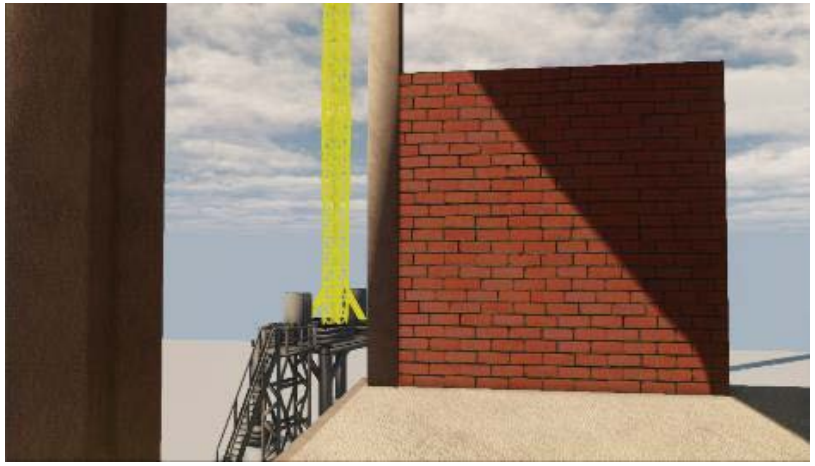
Collision Detection System

V-SAFE: Demo



V-SAFE: Alpha Study

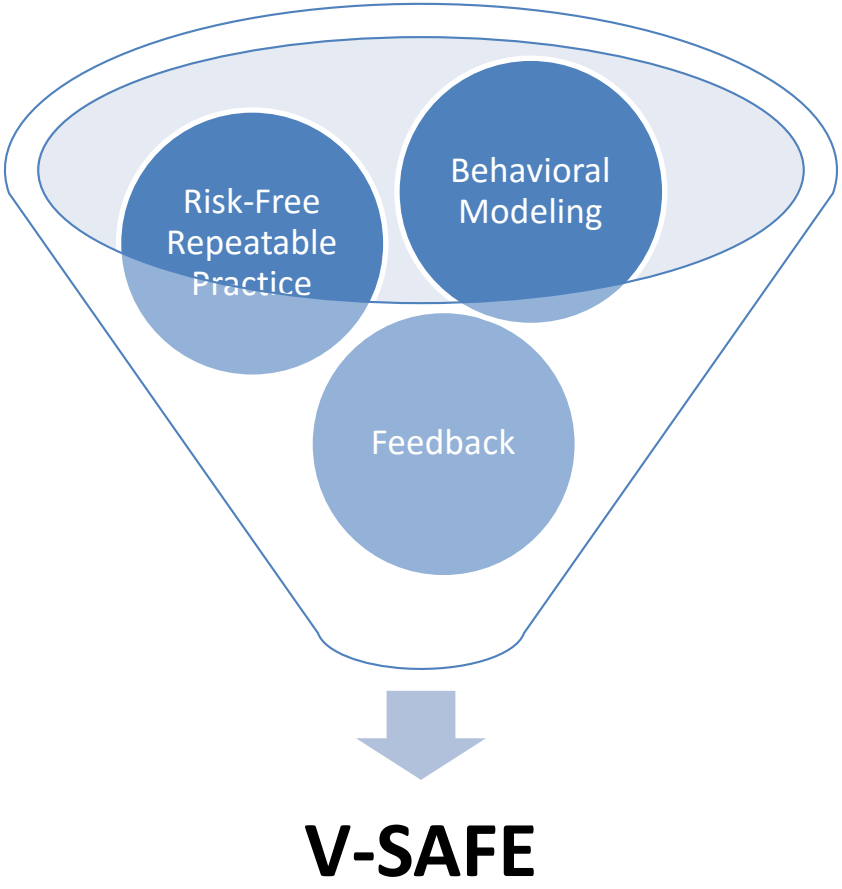
- **Task:** Putting Up a Brick Wall
- **Roles:** Crane Operator, Site Workers, Safety Engineer
- **Goals:** Finishing the task without getting exposed to any accidents



V-SAFE

- ✓ Enhanced hazard identification
- ✓ Repeatable practical experience
- ✓ Spatial awareness
- ✓ Provision of the necessary collaboration between the users
- ✓ Knowledge transfer and interpretability of information
- ✓ Learning by doing approach

Contributions



Conclusion

- Safety management is a complex task in construction projects.
- Traditional learning methods fail to address the needs of the companies.
- This study fills the gap by recommending a highly engaging training method.
- Method could be beneficial to advance the effectiveness of the safety training

Questions

Thanks!

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