

Towards Zero Prototyping of Factory Layout and Operations

Digital Technologies for Mfg Innovation, Nottingham

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Imagination at work

‘Virtualisation’ is one of the pillars of Industrie 4.0.

A virtual factory will enable ‘right-first time’ reconfiguration of future factories.

The highly desirable future ‘Reconfigurable Factory’ requires major advances in, and integration of, many of the technologies we are currently familiar with. Rapid reconfiguration and fast ramp implies increased use of simulation and modelling, testing factory layouts and processes in a virtual reality environment, virtual factory design and virtual factories.

“The factory of the future” (2013) UK Government Foresight report.

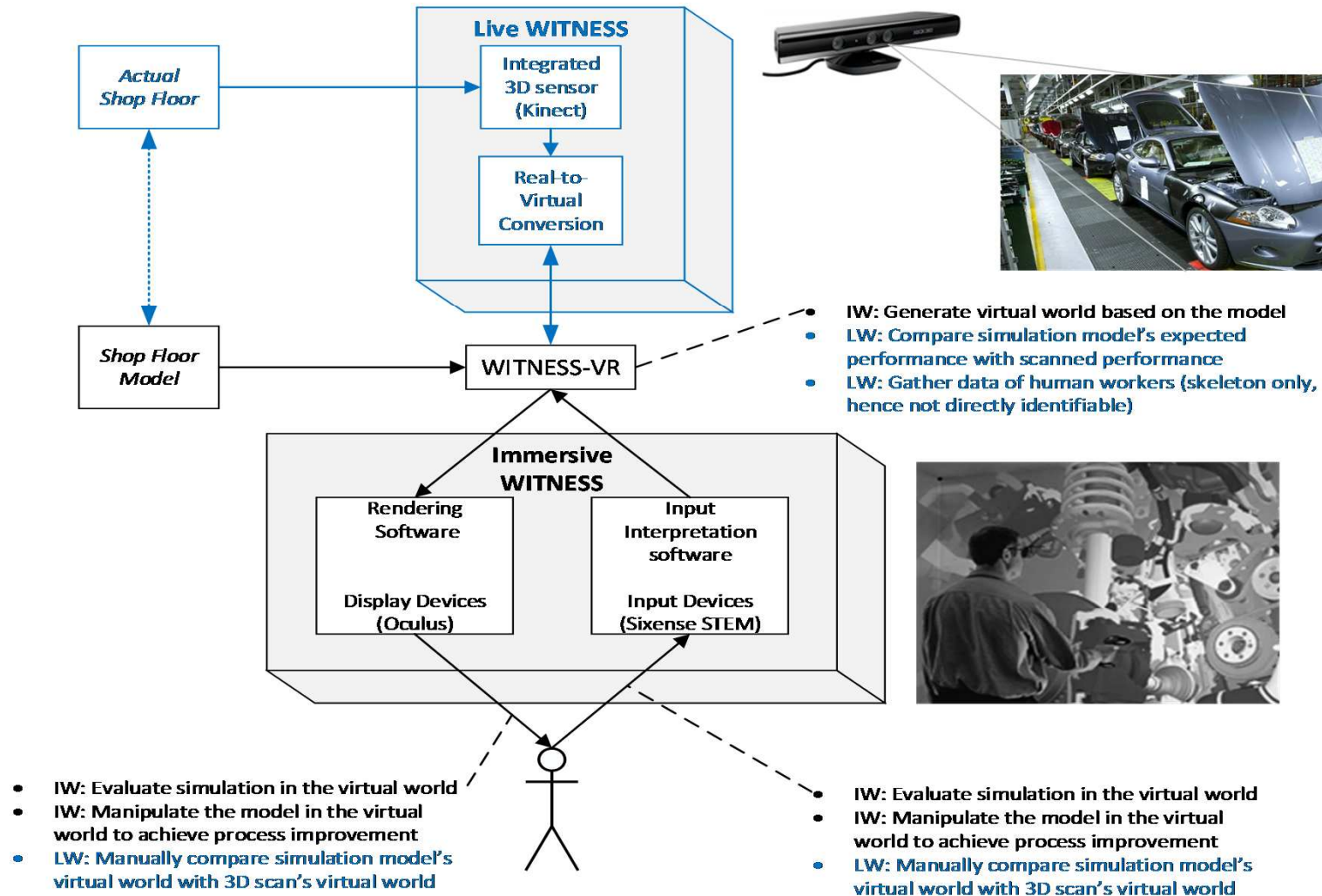


Motivation

- Immersive visualisation of optimal factory layout – to achieve ‘right-first-time’ layouts
- Live capture of 3D image of actual shop floor
- Visualisation of work and material flows – both ‘expected’ and ‘actual’
- Predictive analytics comparing implications of actual performance to production rates



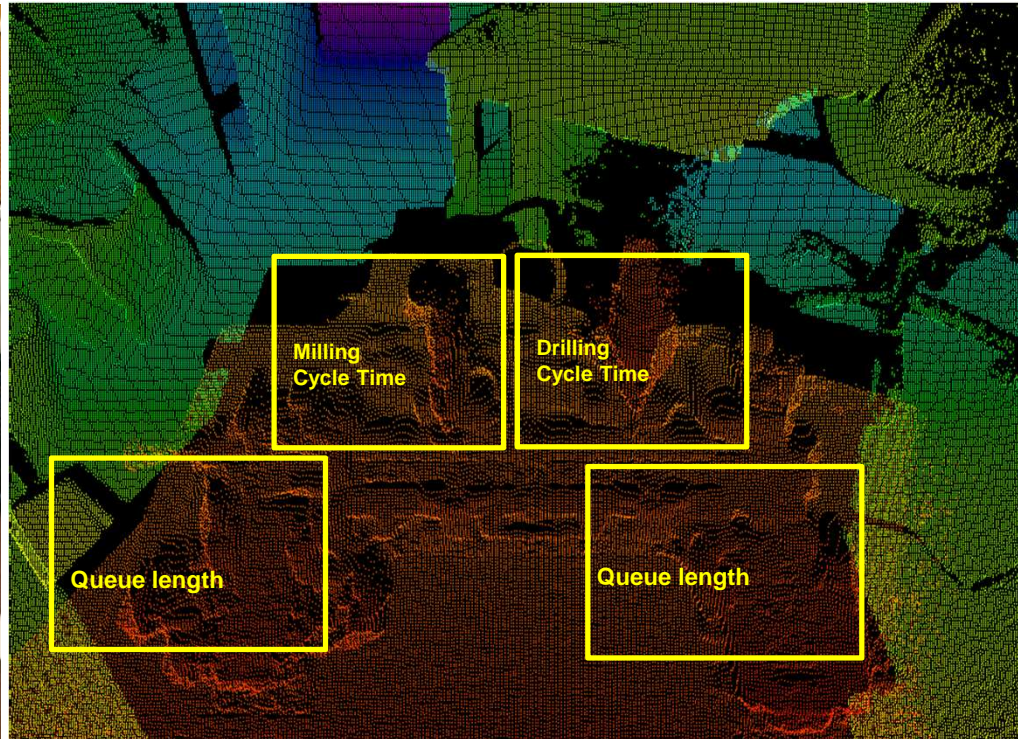
Low cost 3D devices (Kinect & Oculus) and simulation model (WITNESS)



Live WITNESS Model updated by 3D live image



Actual system



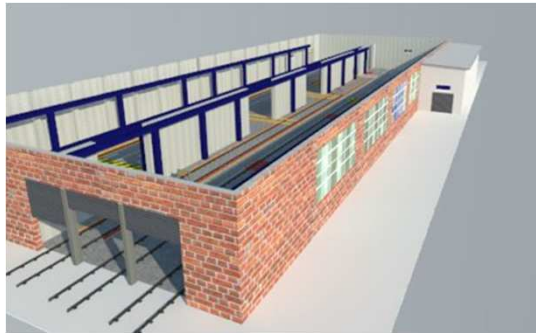
3D Image

Model updates with live shop floor data, identifies deviations and explores their implications.



Immersive WITNESS

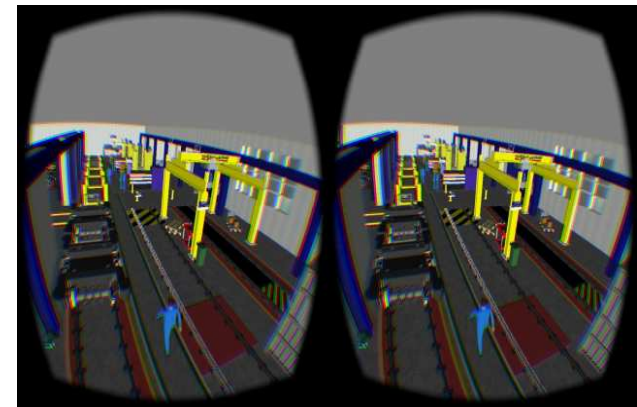
Visualisation of immersive factory model



Test case: train overhaul facility



Real shop floor and its 3D model



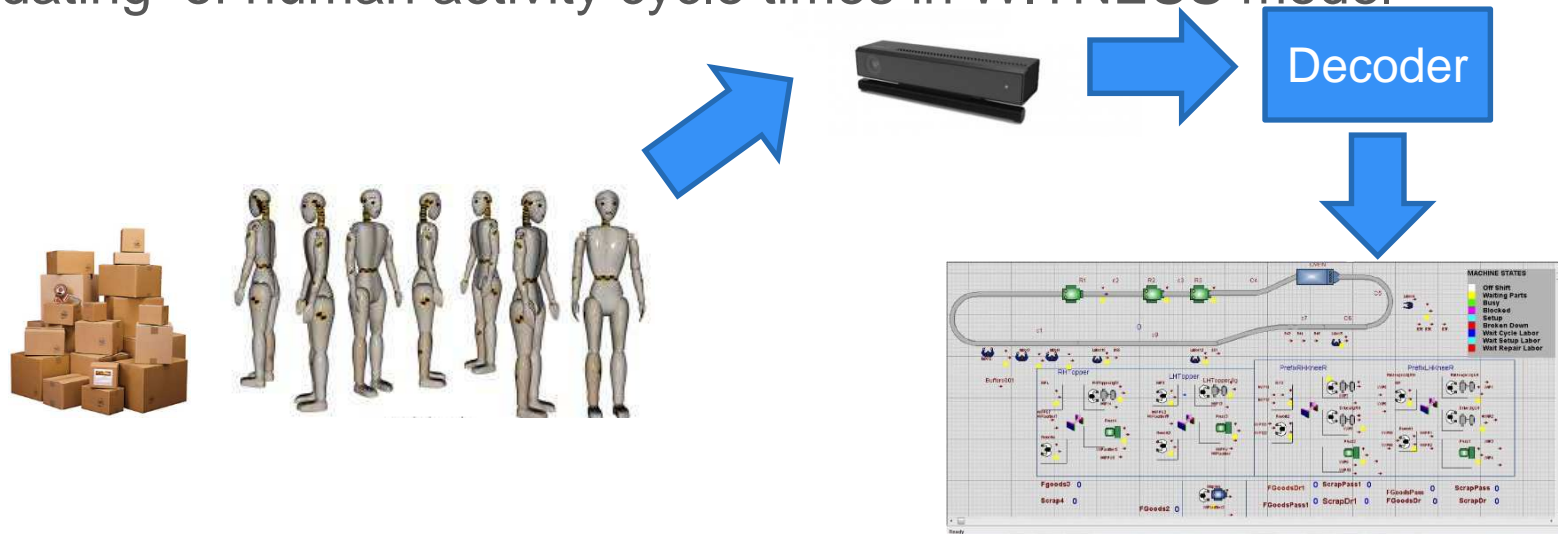
Oculus immersive view



Current Focus: Machine learning for Kinect vision system

People centric updating of WITNESS model using Kinect data

- Detecting of human activity on a use case task
- Capturing, digitisation and decoding of human activity
- Updating of human activity cycle times in WITNESS model



WITNESS Model

Current Focus: Machine learning for Kinect vision system

Machine centric updating of WITNESS model using Kinect data

- Detecting of medium to large scale machine state changes
- Training of Kinect via Machine learning to decode and estimate machine state changes.
- Updating of machine cycle times in the WITNESS model

