

Engineering Research Center for

## **Reconfigurable Manufacturing Systems**

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# **Virtual Fusion: The Complete Integration of Simulated and Actual**

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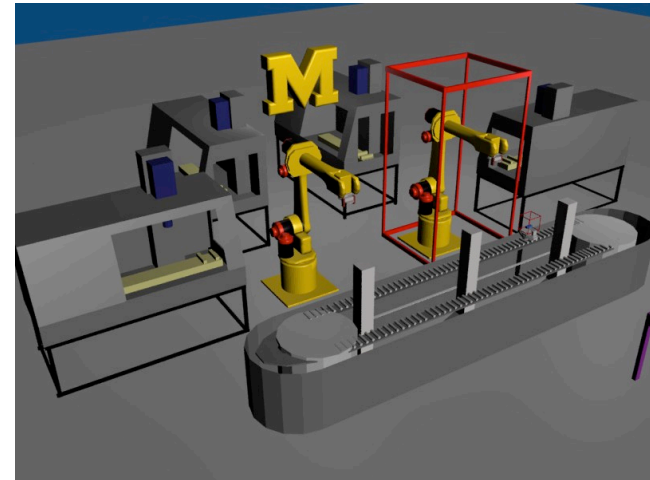
NSF Engineering Research Center for Reconfigurable Manufacturing Systems  
University of Michigan College of Engineering

The University of Michigan, Ann Arbor

# Virtual Fusion: The Complete Integration of Simulated and Actual- *Ongoing (Fall '06) ; Core Project; 1 Student; GM Partner*

- **Objectives**

- *Develop methodology for logic control verification and validation*
- *Pre-launch validation, online monitoring, maintenance and operator training*



- **Key Deliverables**

- ✓ *HIL tools and logic validation survey (CASE 2007)*
- ✓ *Methodology on use of HIL for logic validation*
- ✓ *Software solution for use of HIL in monitoring*
- *Software and hardware solution for remote assisted maintenance*

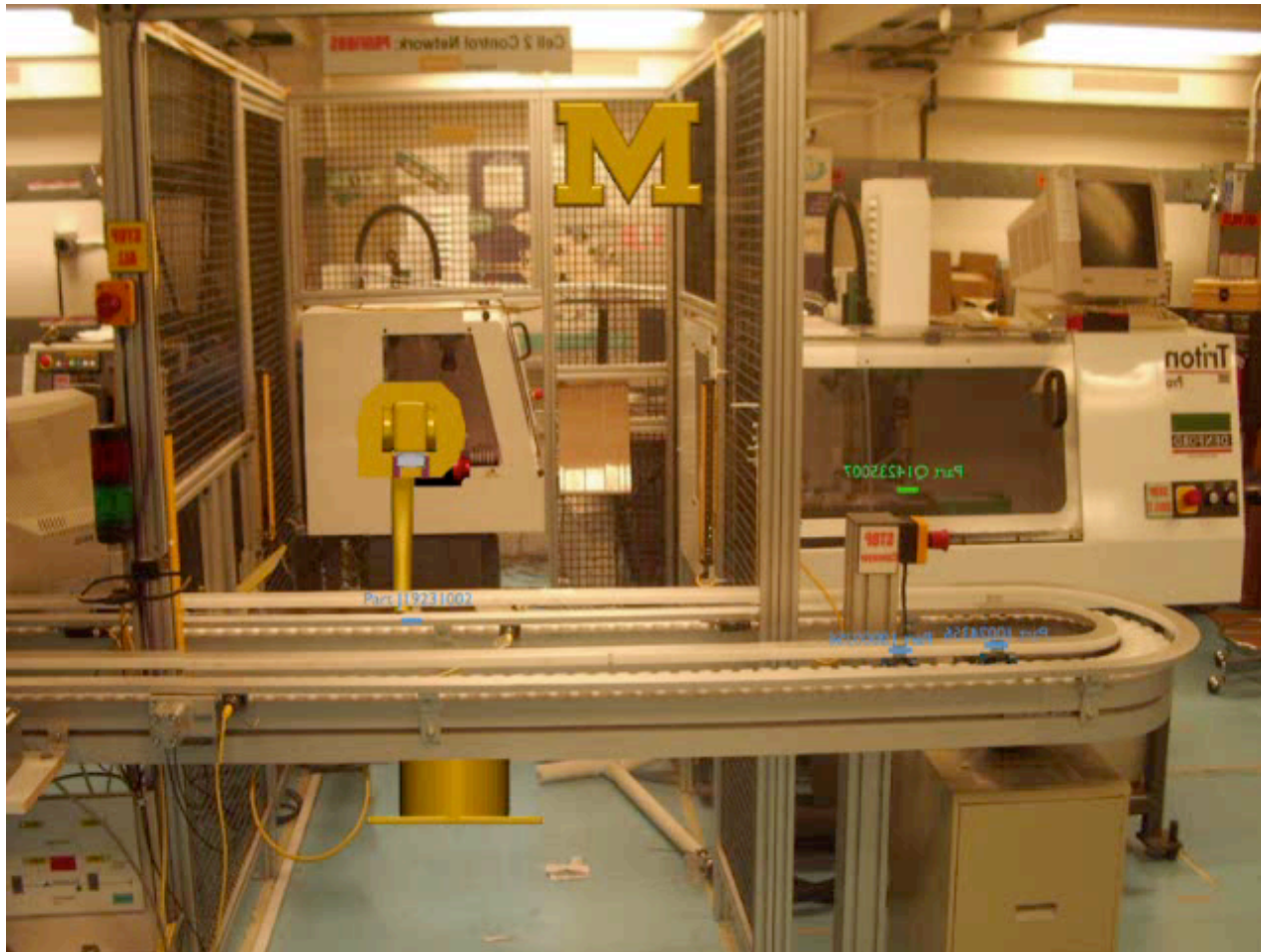
- **Benefits to Industry**

- Identify the **state-of-the-art** of HIL in manufacturing industry
- **Reduce ramp-up and unscheduled down time** due to unanticipated behavior
- Provide a **platform for real-time monitoring and remote maintenance**



# Integrating Simulation into Real Processes

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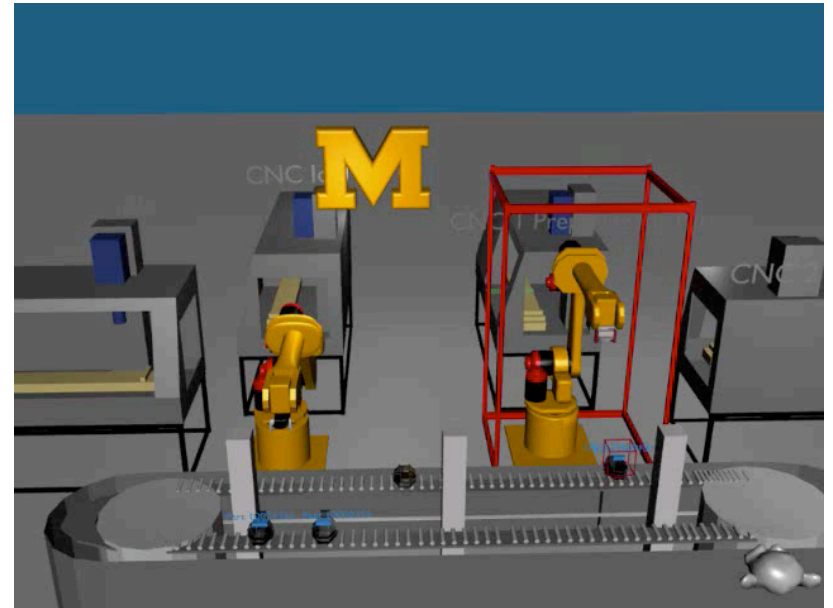


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# Monitoring System Real Time Data

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- **Virtual world reflects real time “ground truth” of the plant floor**
- **Improved information visualization leads to better understanding of system operation, rapid fault diagnosis and reduced downtime**



# Current Accomplishments and Next Steps

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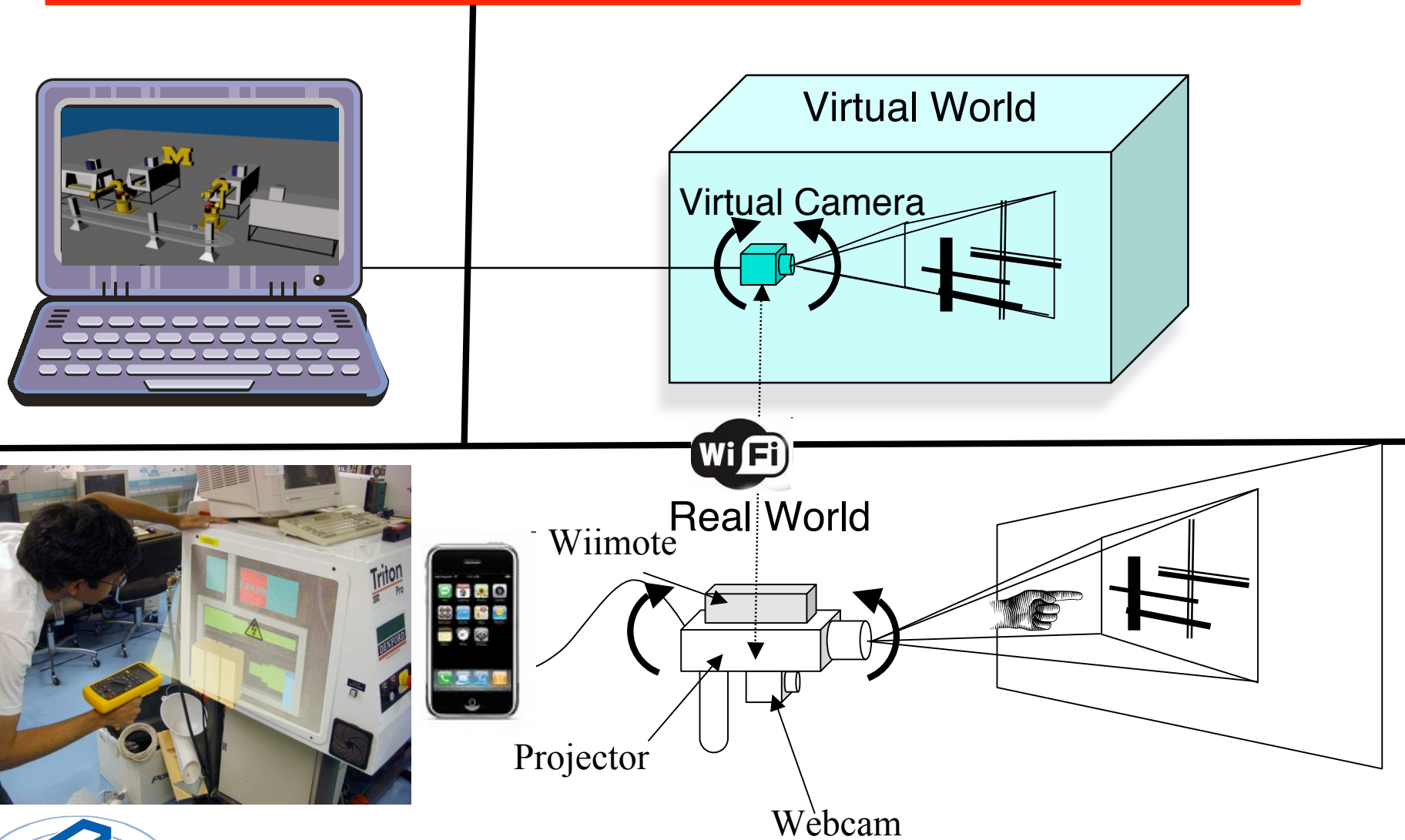
- **Accomplishments to date**
  - **Virtual Entity Integration**
    - » **Addition: Simulated Supply Cell added**
    - » **Replacement: real Fanuc Robot and entire Cell 1 replaced**
    - » **Integration of higher fidelity proprietary simulation**
  - **Virtual Testbed**
    - » **Entire ERC area recreated in 3d interactive virtual environment**
    - » **Real time interaction from and to the real RFT**

- **Next Steps:**

- **Bring people into the loop**



# How Descriptive Junction And Integration



# Descriptive Junction and Integration (DJAI)

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- **DJAI is an augmented reality portal used for information fusion and communication that will enable maintenance people on the plant floor to take advantage of the monitoring system**
  - **Portable information enhanced environments**
  - **Remote assisted maintenance**
  - **Assisted operation**



# The Descriptive Junction and Interface Merges Four Fields in a New Way

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- **SCADA meets information sharing applications, on a game engine platform**
- **Portable large scale context aware**
- **WiFi, RFID, Time of Flight, 2D image processing**
- **Mobile Computing**





## Milestones and Future Plans

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