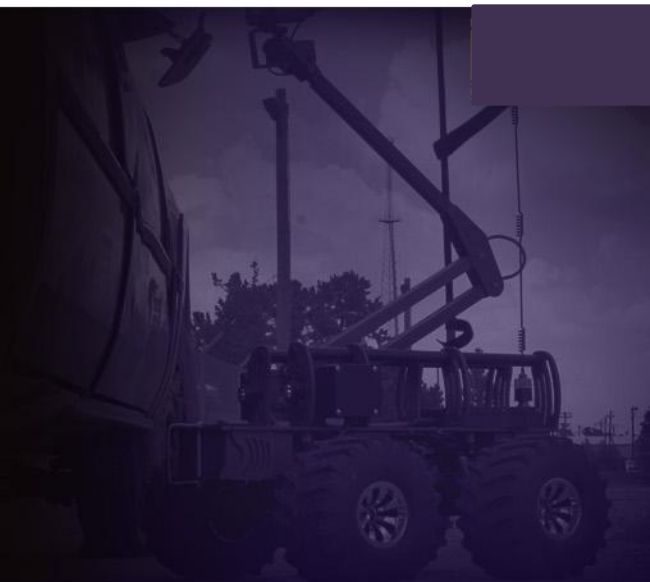




ROBOTIC SYSTEMS



STREAMING VIDEO MODELING FOR ROBOTICS TELEOPERATION

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Report Documentation Page			Form Approved OMB No. 0704-0188		
Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.					
1. REPORT DATE 02 AUG 2011	2. REPORT TYPE N/A	3. DATES COVERED -			
4. TITLE AND SUBTITLE Streaming Video Modeling for Robotics Teleoperation		5a. CONTRACT NUMBER			
		5b. GRANT NUMBER			
		5c. PROGRAM ELEMENT NUMBER			
6. AUTHOR(S) Paul Bounker		5d. PROJECT NUMBER			
		5e. TASK NUMBER			
		5f. WORK UNIT NUMBER			
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) US Army RDECOM-TARDEC 6501 E 11 Mile Rd Warren, MI 48397-5000, USA		8. PERFORMING ORGANIZATION REPORT NUMBER 22151			
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) US Army RDECOM-TARDEC 6501 E 11 Mile Rd Warren, MI 48397-5000, USA		10. SPONSOR/MONITOR'S ACRONYM(S) TACOM/TARDEC/RDECOM			
		11. SPONSOR/MONITOR'S REPORT NUMBER(S) 22151			
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release, distribution unlimited					
13. SUPPLEMENTARY NOTES Presented at the 2011 NDIA Vehicles Systems Engineering and Technology Symposium 9-11 August 2011, Dearborn, Michigan, USA, The original document contains color images.					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT SAR	18. NUMBER OF PAGES 11	19a. NAME OF RESPONSIBLE PERSON
a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified			



AGENDA

ROBOTIC SYSTEMS

- Purpose
- System Architecture
- JGRE FY11 Objectives
- Current Progress
- Communications Model
- Next Steps
- Long Term Plan
- Future Uses



PURPOSE

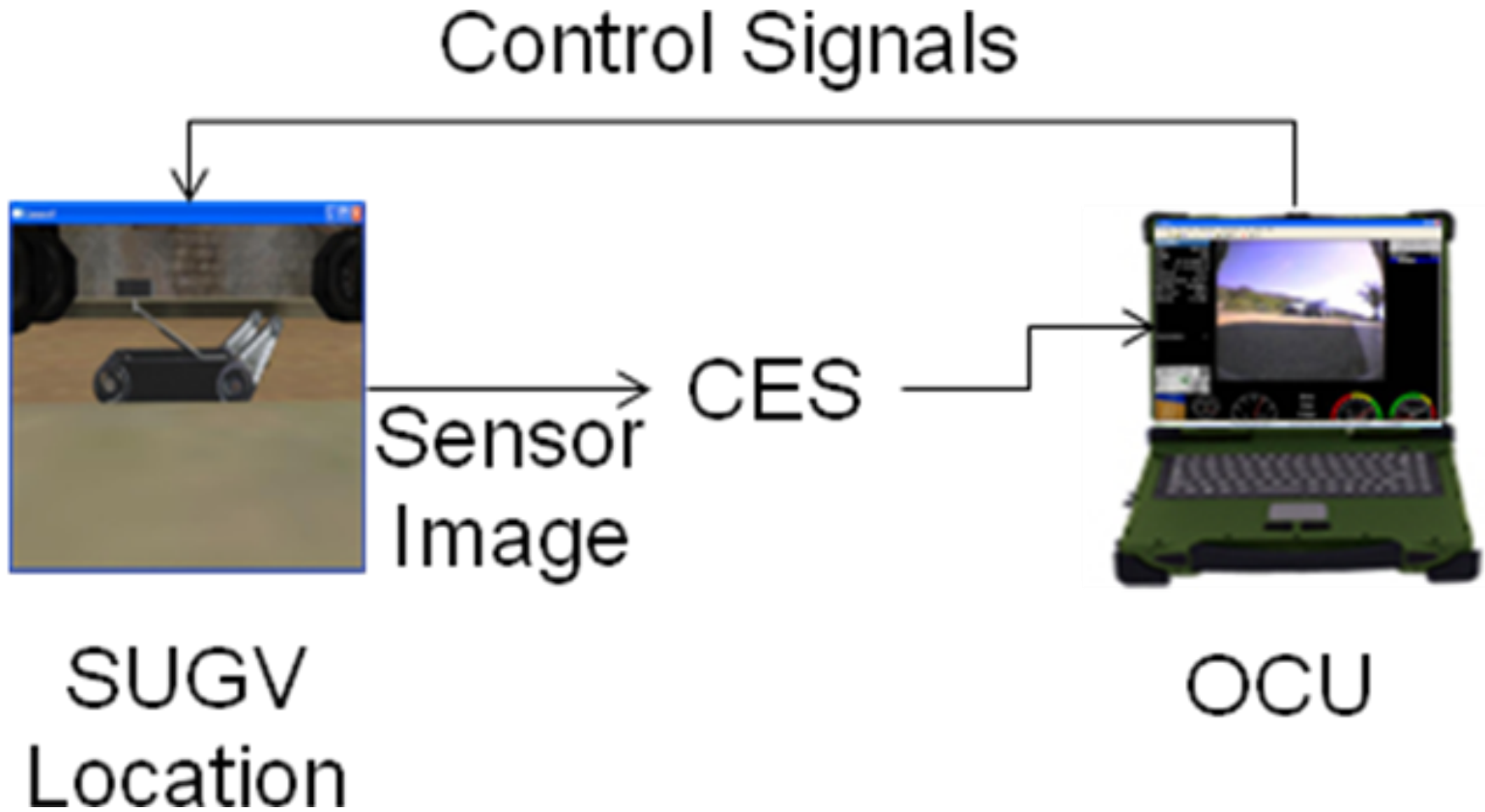
ROBOTIC SYSTEMS



- Reduces Range Testing Costs
 - Range Testing is sometimes inconclusive
 - Impacts Schedule
- Manipulation Technologies development
 - Tradeoff analysis for payloads dependent on streaming video
- Collaborative Operations
 - Evaluation of manned and unmanned systems
 - Sharing of information such as fusion and positioning
- Interoperability
 - Tradeoff analysis for different communications approaches

SYSTEM ARCHITECTURE

ROBOTIC SYSTEMS





FY11 GOALS

ROBOTIC SYSTEMS

- Goal 1: Reuse or modify as needed existing PEO-I CES JTRS models
- Goal 2: Demonstrate the ability to show the simulated impacts on streaming video of the JTRS model
- Goal 3: Demonstrate the ability to show simulated impacts on streaming video of DDL model
- Goal 4: Demonstrate the ability to show simulated impacts on streaming video of the CREW - DUKE model

**Demonstrate the Capability to do Tradeoff Analysis of Radios
Performing Tele-Operation in a Simulated Mission Environment**

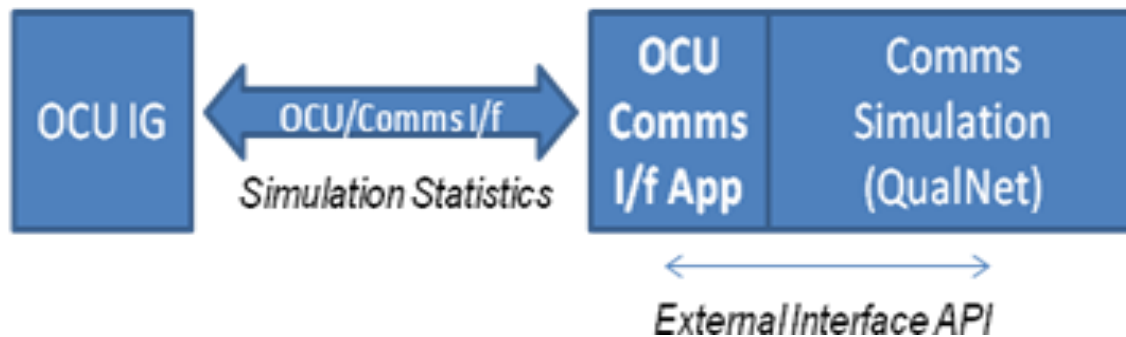


CURRENT PROGRESS

ROBOTIC SYSTEMS



- Leveraging existing PEO-I Comms Effects Server Qualnet Modeling of JTRS radio
- Developed Ubiquiti radio/antenna Model
- SUGV model being used is from the Common Controller program
- Entity state PDUs are being used to update locations and streaming video model
- Streaming video model receives Ubiquiti radio/antenna model performance attributes and displays, jitter, smearing, dropouts, etc.
- Currently using WSMR database, being used by PEO-I for Increment 1 testing.



- Scalable Network Technologies (SNT) – QualNet/CES Developer Network and Communications Simulation Package

Provides

- *Architecture*
- *Graphics*
- *Statistics*
- *External Interfaces (DIS, Socket to IG)*



COMMUNICATIONS MODEL SCENARIO

ROBOTIC SYSTEMS



- Simulation Duration: 3.5 min (210 sec)
- Data tx from 1 sec to 180 sec to allow time for all data to be transmitted and received.
- 2 Nodes:
 - OCU, 1 Radio
 - SUGV, 1 Radio
- DIS Interface for Mobility Models (OCU, SUGV)
- Terrain (WSMR, 32N 107W)
- Urban Model Auto Select Propagation Model
- Metropolitan Path loss Model



NEXT STEPS

ROBOTIC SYSTEMS

- Evaluation of JTRS/SRW 1.1
- Evaluation of DDL
- Demonstration of Repeaters
- Demonstration of Encryption
- Demonstration of Jamming Effects



LONG TERM PLAN

ROBOTIC SYSTEMS



- Evaluate communications impacts from inside buildings to include different material types (steel, wood, concrete, etc.) (2012)
- The impact from Urban Canyons to be addressed (2012)
- Weather (rain, snow, wind, smoke) impacts on streaming video communications (2013)
- Node hopping, self healing, fusion, situational awareness and their resultant impacts on streaming video capabilities (2014)



FUTURE USES

ROBOTIC SYSTEMS

- Evaluate dead spots/dropouts for field testing
- Interest by SPAWAR and NAVEODTECH
- IED jamming issues could be addressed
- As autonomy continues to increase, additional capabilities such as target acquisition and engagement in a reduced communications environment can be studied and worked on with appropriate degradation to video and sensor images
- Teaming algorithms could be developed and assessed in a degraded communications environment