Exhibit R-2, RDT&E Budget Item Justification: PB 2011 Office of Secretary Of Defense										DATE: February 2010	
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 4: *Advanced Component Development & Prototypes (ACD&P)*				R-1 ITEM NOMENCLATURE PE 0603709D8Z: *Joint Robotics Program*							
COST ($ in Millions)	**FY 2009 Actual**	**FY 2010 Estimate**	**FY 2011 Base Estimate**	**FY 2011 OCO Estimate**	**FY 2011 Total Estimate**	**FY 2012 Estimate**	**FY 2013 Estimate**	**FY 2014 Estimate**	**FY 2015 Estimate**	**Cost To Complete**	**Total Cost**
Total Program Element	11.086	15.279	9.878	0.000	9.878	12.175	12.392	11.675	11.299	Continuing	Continuing
P709: *Joint Robotics Program*	11.086	15.279	9.878	0.000	9.878	12.175	12.392	11.675	11.299	Continuing	Continuing

A. Mission Description and Budget Item Justification

(U) This Program Element (PE) was established in response to Congressional guidance to consolidate DoD robotic programs on unmanned ground systems and related robotic technologies in order to increase the focus of the robotic programs on operational requirements. Technologies in the PE support the continued development of technologies beyond Budget Activity 3 (PE 0603711D8Z) for technology transition and transformation to close warfighter requirement capability gaps. By exercising its oversight role through a technology advisory board, senior military Council and Senior Steering Group (Flag level), Joint Ground Robotics (JGRE) applies this PE to enable coordination between the Services and places emphasis on interoperability and commonality among unmanned ground systems. This PE funds efforts to overcome technology barriers in thrust areas of unmanned ground system technologies to include Autonomous & Tactical Behaviors, Manipulation Technologies, Collaborative Operations, Interoperability, Man-portable Unmanned Ground System Technologies, and Technology Transition/Transformation. This PE funds unmanned ground system technologies and supports the integration of technologies into representative models or prototype systems in a high fidelity and realistic operating environment and expedites technology transition from the laboratory to operational use. Emphasis is on proving component and subsystem maturity prior to integration in major and complex systems and may involve risk reduction initiatives. Within this PE, funded projects will continue the delivery of advanced technology directed at enhancing the warfighter's capabilities identified during new concept development, operational assessments and field feedback of current unmanned systems. The technologies are generally at TRL 4 or 5 with the intent to mature them through JGRE efforts to TRL 6.

Exhibit R-2, RDT&E Budget Item Justification: PB 2011 Office of Secretary Of Defense	DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 ITEM NOMENCLATURE** PE 0603709D8Z: *Joint Robotics Program*

B. Program Change Summary ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Previous President's Budget	11.782	11.803	0.000	0.000	0.000
Current President's Budget	11.086	15.279	9.878	0.000	9.878
Total Adjustments	-0.696	3.476	9.878	0.000	9.878
• Congressional General Reductions		0.000			
• Congressional Directed Reductions		0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds		3.600			
• Congressional Directed Transfers		0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-0.158	0.000			
• Other Program Adjustments	-0.538	-0.124	9.878	0.000	9.878

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2009	FY 2010
Project: P709: *Joint Robotics Program*		
Congressional Add: *Autonomous Machine Vision for Mapping and Investigation of Remote Sites*	0.000	1.600
Congressional Add: *Joint Robotics Training Program*	0.000	2.000
Congressional Add Subtotals for Project: P709	0.000	3.600
Congressional Add Totals for all Projects	0.000	3.600

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense			DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	R-1 ITEM NOMENCLATURE PE 0603709D8Z: *Joint Robotics Program*	PROJECT P709: *Joint Robotics Program*	

COST ($ in Millions)	FY 2009 Actual	FY 2010 Estimate	FY 2011 Base Estimate	FY 2011 OCO Estimate	FY 2011 Total Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost To Complete	Total Cost
P709: *Joint Robotics Program*	11.086	15.279	9.878	0.000	9.878	12.175	12.392	11.675	11.299	Continuing	Continuing
Quantity of RDT&E Articles											

A. Mission Description and Budget Item Justification

(U) This Program Element (PE) was established in response to Congressional guidance to consolidate DoD robotic programs on unmanned ground systems and related robotic technologies in order to increase the focus of the robotic programs on operational requirements. Technologies in the PE support the continued development of technologies beyond Budget Activity 3 (PE 0603711D8Z) for technology transition and transformation to close warfighter requirement capability gaps. By exercising its oversight role through a technology advisory board, senior military Council and Senior Steering Group (Flag level), Joint Ground Robotics (JGRE) applies this PE to enable coordination between the Services and places emphasis on interoperability and commonality among unmanned ground systems. This PE funds efforts to overcome technology barriers in thrust areas of unmanned ground system technologies to include Autonomous & Tactical Behaviors, Manipulation Technologies, Collaborative Operations, Interoperability, Man-portable Unmanned Ground System Technologies, and Technology Transition/Transformation. This PE funds unmanned ground system technologies and supports the integration of technologies into representative models or prototype systems in a high fidelity and realistic operating environment and expedites technology transition from the laboratory to operational use. Emphasis is on proving component and subsystem maturity prior to integration in major and complex systems and may involve risk reduction initiatives. Within this PE, funded projects will continue the delivery of advanced technology directed at enhancing the warfighter's capabilities identified during new concept development, operational assessments and field feedback of current unmanned systems. The technologies are generally at TRL 4 or 5 with the intent to mature them through JGRE efforts to TRL 6.

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Autonomous & Tactical Behaviors	3.315	2.222	1.763	0.000	1.763
Development of vehicle onboard intelligence and tactical behaviors for greater autonomy. These technologies will increase the warfighters' ability to accomplish military task with greater effectiveness, while simultaneously reducing their risk to exposure and harm.					

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	R-1 ITEM NOMENCLATURE PE 0603709D8Z: *Joint Robotics Program*	PROJECT P709: *Joint Robotics Program*

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
FY 2009 Accomplishments: * Autonomous Navigation for Small UGVs (ANSU) delivered the 1st generation sensor suite and began demonstration of the 2nd generation sensor suite on representative platform capable of detecting obstacles of 6” or greater at a range of 3 meters. Guarded tele-operation capable of avoiding obstacles 12” or greater in height at speeds of not less than 1m/s. * Tactical Behaviors for Explosive Ordanance Disposal (EOD) completed requirements report and publish solicitations requesting proposals. Conducted design review and completed test reporting for visualization payloads for the Mk 1 and/or Mk 2. * Automate Aircraft (Ground) Refueling (AAGR) connected the fuel nozzle to the Single Point Refueling (SPR) adapter or the In-flight Refueling (IFR) port/probe on AC mock-up. Incorporated the vision-based positioning and fuel nozzle handling capabilities; Test sub-systems; Make improvements, if necessary and document any changes. * Human Presence and Detection incrementally improve detection rate and detection range from small vehicle by detecting human presence at a minimum range of 15 m at 80 percent detection rate and 10 percent false alarm rate. *FY 2010 Plans:* * Autonomous Navigation for Small UGVs (ANSU) will complete demonstration of the 2nd generation sensor suite on representative platform capable of detecting obstacles of 6” or greater at a range of 3 meters. * Unmanned Ground Vehicles for Small Unit Logistics will deliver experiment final report, Center for Naval Analysis Report, and X-File Report. Project was previously funded from PE 0603711D8Z as TRL level matured.					

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	R-1 ITEM NOMENCLATURE PE 0603709D8Z: *Joint Robotics Program*	PROJECT P709: *Joint Robotics Program*

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
* Very Low Cost LADAR will deliver new low cost MIL rugged eye-safe LADAR built based on automotive driven capabilities (smaller than the typical automotive radar unit, better than 3 cm accuracy, two axis scan, and 200 meter or better range). * Long Range Vision for Obstacle Detection will demonstrate the ability to reliably classify terrain out to 100m in both structured and unstructured outdoor terrain. *FY 2011 Base Plans:* * Own the Night v2 will deliver extention to small UGV platform mission set to include autonomous coordinated acquisition of day/night terrain area in or outside of buildings, optimized to provide dynamic sensor platform coverage of an area of egress or ingress. Leverage mature SLAM navigation methods that do not depend on GPS. Make UGV formation (or swarm) relay messages & status to soldiers through FBCB2 (JVMF) and OneVT (One video terminal used for UAV video down links). Project was previously funded from PE 0603711D8Z . TRL level was matured. * Very Low Cost LADAR will develop a new, low cost ruggedized and militarized eye-safe LADAR based on automative-driver capabilities. Efforts will focus on small unit size, greater accuracy, have a 2-axis scan and greater range. Year one (1) pre-production test units. * Collision Prediction Utilizing Traversability Models for Dynamic Environments will develop mechanisms using "rules of the road" to create predictions, as well as algorithms, to speed up Monte Carlo simulations of the terrain effects. Will develop moving obstacle detection that will benefit from these algorithms for predicting the movers' motions (based on road network). Testing is to be performed in simulation in first year, and in the field the second year (possibly using the CAMS JCTD assets).					
Collaborative Operations	0.000	6.319	5.208	0.000	5.208

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	R-1 ITEM NOMENCLATURE PE 0603709D8Z: *Joint Robotics Program*	PROJECT P709: *Joint Robotics Program*

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Integrate communication, mission planning, interface technologies, and advanced intelligence capabilities to support collaborative operations between manned and unmanned systems. Develop and assess several strategies to enhance tele-operation of current Unmanned Ground Vehicles (UGV) and collaborative Unmanned Air Vehicles (UAV) teams. Development of these technologies will enable unmanned systems to support warfighter concepts of operation that are envisioning unmanned systems working in collaboration across domains (air, ground, and maritime) to execute tactical missions and complex military tasks. *FY 2010 Plans:* * Counter Tunnel Technology Survey and Experimentation will evaluate COTS technologies as applied to counter tunnel mission area; perform warfighter user evaluation of technologies; and report on capability gaps and determine technologies that need to be developed to meet warfighter needs. * HRI for Explosive Ordinance Disposal will perform a task-oriented analysis of the human robot interface for the next generation of EOD systems. This analysis will be used to design the user interface for a common controller for the family of EOD systems being developed under the AEODRS program. * High Speed Small Teleoperated Robot Command and Control will quintuple to practical long-term teleoperation speed of small robots. * Urban Environment Exploration will mature adaptive localization behaviors with intermittent GPS beyond 2 buildings by localizing inside buildings within .5 m; localizing outside buildings within 2 m; localizing over a 1 mile radius; and transitioning in-and-out of 3 single-story building structures. Project transitioned from PE 0603711D8Z as TRL level matured. * Autonomous Navigation Environment (VANE) identified existing modeling processes and integration with VANE simulation. Identified transition paths for VANE CTB products. Develped dynamic scene					

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
generation for dense vegitation. Initiated development of ANVEL software in tandem with preparing ANVEL software for release as an open source product. * Urban Environment Modeling will demonstrate autonomous generation of a 3-D world model of a 2x2 city block area using fused sensor data. Project transitioned from PE 0603711D8Z as TRL level matured. * Miniature 3D Spatial Phase Sensors will develop and demonstrate 2nd generation SPI camera system reducing size from current prototype to 4x4x5 inches, port several steps of the processing pipeline to an integrated FPGA or parallel processor image, change surface normal vector and 3D surface data output at least 20Hz at least 4-megapixel resolution. Project was previously funded from PE 0603711D8Z as TRL level matured. *FY 2011 Base Plans:* * HRI for Explosive Ordinance Disposal (EOD), based on the results of the previous year efforts, will conduct another analysis of the human robot interface for the next generation of EOD systems and further refine the interface capability. * Urban Environment Exploration will mature adaptive localization behaviors with intermittent GPS to cover a city block, including multi-story buildings by localizing inside buildings within .3m; localizing outside buildings within 1m; localize over a 3 mile radius; and transitioning in and out of 5 building structures, including 2 multi-story buildings. * High Speed Small Teleoperated Robot Command and Control will quintuple to practical long-term teleoperation speed of small robots.					

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
* Autonomous Navigation Environment (VANE) will develop inferencing algorithms of complex scenes and texturing, measure platform physical characterization methods and develop translation processes of environmental data models for different modeling architectures. * Urban Environment Modeling will demonstrate autonomous generation of a 3-D world model of an ~10x10 city block area in an operationally relevant environment using fused sensor data with the following metrics: Model Resolution > 20cm; Model Accuracy > 50cm; Global Registration Accuracy > 2m; and demonstrate autonomous generation of a 3-D world model of a 2x2 city block area using fused sensor data. * Miniature 3D Spatial Phase Sensors will develop and demonstrate 3rd generation miniature SPI camera system reducing in size to 3x3x3 inches (not including optics); provide full data processing (through surface normal integration stage) on integral hardware (FPGA/ASIC/Parallel processor) image, surface normal, and 3D surface data output at 30Hz at 8-megapixel resolution; interfacing and power consistent with reasonable small UGV constraints (ieee1394/usb/ethernet); and additional onboard processing options available such as model/data decimation, feature identification/tracking, patch segmentation, etc. (exact details TBD).					
Interoperability Software algorithms and interface technologies will facilitate sharing of data across unmanned platforms and domains, and with C2 systems as well as interchangeability of mission payloads and unmanned chassis. Such interoperability will enable collaborative operations between manned and unmanned systems as well as among unmanned systems in differing domains. *FY 2009 Accomplishments:* * Joint Architecture for Unmanned Systems (JAUS) Develop 1st draft interface specifications for platform mobility, Serial manipulation, mission execution, and environment sensing. Obtained	2.127	1.000	0.262	0.000	0.262

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
consensus from AS-4 on draft interface specifications. Validated draft interface specifications through use case tests as required by SAE AS-4 for acceptance. Present draft interface specifications to AS-4. * Robotic Systems Technical and Operational Metrics Correlation completed collected Analysis of Operational Scenarios; definition and measurement of technical performance metrics; survey preparation and gathering of user information. * Man-Portable Unmanned Groung Vehicles (Cobra Gold) delivered warrior payload, completed chaos development, completed chaos payload, government testing, and participated in warfighter experiment. *FY 2010 Plans:* * 3D Visualization for Explosive Ordinance Disposal will demonstrate generation of a 3D model of a moderately complex object from sensors mounted to an EOD class UGV and demonstrate generation of a 3D model of a moderately complex object from sensors on an EOD class UGV that > 95 percent complete and a max error of < 5 percent. Project transitioned from PE 0603711D8Z as TRL level matured. *FY 2011 Base Plans:* * 3D Visualization for Exlosive Ordinance Disposal will demonstrate the localization of the manipulator relative to the object with an accuracy of 5% using the same sensors used to build the model.					
Man Portable UGS Technologies Increase warfighter capability by transferring and developing technologies of immediate impact on man-portable robotic systems - e.g., obstacle detection/obstacle avoidance (ODOA) and collaborative behaviors for small vehicles. Certain missions and mission environments (urban, unimproved surface, mountainous, subterranean) require the use of man-portable robots in support of dismounted	0.800	0.000	0.000	0.000	0.000

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
operations. Technologies that can be scaled to low size, weight, space, and power density will enable robotic solutions to capability needs in dismounted operation areas and challenging environments. *FY 2009 Accomplishments:* * Man-Portable Intelligence gathering, Surveillance, and Reconnaissance (ISR) Robot produced one fully functional prototype; completed in-house system validation tests; completed user-ready prototype. TRL matured and project will continue in FY 2010 under PE 0603709D8Z.					
Manipulation Technologies Incorporate existing technologies, enable greater range of robotic manipulation, support the development of mobile manipulation, and improve manipulator performance. Development of these technologies will enable unmanned systems to conduct highly dexterous tasks that today are accomplished manually, but currently place warfighter's in extremely vulnerable and dangerous situations. *FY 2009 Accomplishments:* * Battlefield Extraction – Assist Robot (BEAR) developed full simulation model of BEAR to include integration with operator OCU modules and OneSAF. (RSJPO, TARDEC, TATRC, MBL, Vecna, Anthrotronix) demonstrating BEAR capability to war fighters and receive feedback on military utility. Conducted a contractor-operated User Assessment of a BEAR operational prototype system at Maneuver Battle Lab (MBL) McKenna Military Operations in Urban Terrain (MOUT) site, Fort Benning, GA, *FY 2010 Plans:* * BEAR will complete full integration of both live and simulated operational mission scenarios at Fort Benning Maneuver Battle Lab MOUT site and Simulation Center. Conduct full operational assessment of BEAR to include integrated manipulators on battlefield technologies with soldier operators and	0.570	1.250	0.350	0.000	0.350

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
integrated simulations at the McKenna MOUT site, Fort Benning, GA, with a combined simulation of an operational environment. Prepare for Milestone B and transition to Program of Record. * Advanced Hydraulic Actuator will build a high-dexterity robot manipulator based on advanced hydraulic actuators that will significantly extend the mission capabilities over existing ground robotics. Specifically it will be able to easily manipulate objects over 100 pounds, it will be energy efficient, will achieve precise control both in terms of position and force, and will have at least 7 degrees of freedom providing the dexterity for complex tasks. * Robotic Gripper with Adjustable Passive Compliance will develop a general purpose robotic gripper with adjustable passive compliance that can manipulate most objects a human hand could. Project will build an efficient actuation system with integrated position and force sensing; and a passive impedance control system, where passive characteristics are adjustable. *FY 2011 Base Plans:* * Robotic Gripper with Adjustable Passive Compliance will continue the development effort of the previous year. This effort will include the capability of manipulating objects, handling breakable objects, and interacting with humans.					
Technology Transition / Transformation Facilitate integration of technologies to ongoing programs: exploit best features of past and ongoing efforts, e.g., interface technologies (Human Robot Interaction) and autonomous operations. Robotics technologies are being matured with the express intent of transitioning them out of the laboratory to either development programs of record, licensing to industry to foster COTS solutions, or integration onto fielded systems.	4.274	0.888	2.295	0.000	2.295

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	R-1 ITEM NOMENCLATURE PE 0603709D8Z: *Joint Robotics Program*	PROJECT P709: *Joint Robotics Program*

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
FY 2009 Accomplishments: Funding has been utilized to assist in transition or transformation of the following projects but not limited to: * Automated Aircraft (Ground) Refueling (AAGR) * Tactical Behaviors for Explosive Ordanance Disposal (EOD) * Human Presence and Detection * Man-Portable Intelligence gathering, Surveillance, and Reconnaissance (ISR) Robot * Man-Portable Unmanned Ground Vehicles (Cobra Gold) * Joint Architecture for Unmanned Systems (JAUS) * Robotic Systems Technical and Operational Metrics Correlation *FY 2010 Plans:* Funding will be utilized to assist in transition or transformation of the following projects but not limited to: * Autonomous Navigation for Small UGVs (ANSU) * Battlefield Extraction – Assist Robot (BEAR) * Advanced Hydraulic Actuator * Unmanned Ground Vehicles for Small Unit Logistics *FY 2011 Base Plans:* Funding will be utilized to assist in transition or transformation of the following projects but not limited to: * HRI for Explosive Ordinance Disposal * Urban Environment Exploration * Maritime Interdiction Operations Experimentation					

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	R-1 ITEM NOMENCLATURE PE 0603709D8Z: *Joint Robotics Program*	PROJECT P709: *Joint Robotics Program*

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
* Robotic Gripper with Adjustable Passive Compliance * Very Low Cost LADAR * Long Range Vision for Obstacle Detection * Own the Night v2 * High Speed Small Teleoperated Robot Command and Control * Autonomous Navigation Environment (VANE) * Urban Environment Modeling * 3D Visualization for Explosive Ordinance Disposal Robots * Miniature 3D Spatial Phase Sensors * Collision Prediction Utilizing Traversability Models for Dynamic Environments					
Accomplishments/Planned Programs Subtotals	11.086	11.679	9.878	0.000	9.878

	FY 2009	FY 2010
Congressional Add: Autonomous Machine Vision for Mapping and Investigation of Remote Sites *FY 2010 Plans:* Description not provided as of this date.	0.000	1.600
Congressional Add: Joint Robotics Training Program *FY 2010 Plans:* Description not yet provided as of this date	0.000	2.000
Congressional Adds Subtotals	0.000	3.600

Exhibit R-2A, RDT&E Project Justification: PB 2011 Office of Secretary Of Defense		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	R-1 ITEM NOMENCLATURE PE 0603709D8Z: *Joint Robotics Program*	PROJECT P709: *Joint Robotics Program*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total	FY 2012	FY 2013	FY 2014	FY 2015	Cost To Complete	Total Cost
• 0603711D8Z : *Autonomous*	8.535	11.020	9.943		9.943	11.048	11.343	11.526	11.733	Continuing	Continuing
• 0604709D8Z : *Robotics*	5.420	5.086	4.155		4.155	3.126	2.986	3.028	3.157	Continuing	Continuing

D. Acquisition Strategy

N/A

E. Performance Metrics

1. Technologies to be funded & developed are reviewed by Joint Capability Area focused working groups and the Joint Staff Functional Capabilities Boards to determine progress, transition plans, and relevance of each project.
2. Project plans are submitted, evaluated and analyzed by the Joint Robotics Ground Enterprises management and technical staff for risk and progress.
3. Project progress toward goals and milestones is assessed during mid-year and end-of-year reviews.
4. Technologies developed by the Joint Robotics Ground Enterprises (JGRE) are tracked and documented using the DoD Technical Readiness Level (TRL) scale for developing TRL 3 or 4 technologies to TRL 6 and adhearing to the integrated baselines with regard to cost and schedule.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2011 Office of Secretary Of Defense		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	R-1 ITEM NOMENCLATURE PE 0603709D8Z: *Joint Robotics Program*	PROJECT P709: *Joint Robotics Program*

Product Development ($ in Millions)

				FY 2010		FY 2011 Base		FY 2011 OCO		FY 2011 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Total Prior Years Cost	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Joint Ground Robotics Enterprise	MIPR	TBD TBD	11.682	15.176	Sep 2098	9.878	Sep 2098	0.000		9.878	Continuing	Continuing	Continuing
		Subtotal	11.682	15.176		9.878		0.000		9.878			

Remarks

Funding value captures the total planned for obligation across the PE. The Joint Ground Robotics Enterprise (JGRE) utilizes several contracting and management strategies to achieve its objectives. This PE supports the need to integrate technologies into representative models or prototype systems in a high fidelity and realistic operating environment and expedite technology transition from the laboratory to operational use. Emphasis is on proving component and subsystem maturity prior to integration in major and complex systems and may involve risk reduction initiatives. Funded projects will continue the delivery of responses to advanced technology needs enhancing the warfighter's capabilities identified during concept development, operational assessments and field feedback of current unmanned systems.

Management Services ($ in Millions)

				FY 2010		FY 2011 Base		FY 2011 OCO		FY 2011 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Total Prior Years Cost	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Joint Ground Robotics Enterprise Support	MIPR	TBD TBD	0.100	0.103	Sep 2010	0.000	Sep 2010	0.000		0.000	Continuing	Continuing	Continuing
		Subtotal	0.100	0.103		0.000		0.000		0.000			

Remarks

Exhibit R-3, RDT&E Project Cost Analysis: PB 2011 Office of Secretary Of Defense			DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	R-1 ITEM NOMENCLATURE PE 0603709D8Z: *Joint Robotics Program*	PROJECT P709: *Joint Robotics Program*	

	Total Prior Years Cost	FY 2010		FY 2011 Base		FY 2011 OCO		FY 2011 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	11.782	15.279		9.878		0.000		9.878			

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2011 Office of Secretary Of Defense			DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	R-1 ITEM NOMENCLATURE PE 0603709D8Z: *Joint Robotics Program*	PROJECT P709: *Joint Robotics Program*	

	FY 2009				FY 2010				FY 2011				FY 2012				FY 2013				FY 2014				FY 2015			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Joint Collaborative Technologies Experiment				▮																								
Robotic Convoy Technologies- Warfighter Experiment								▮																				
Networked Robotic Communication Solutions								▮																				
Unmanned System Training - Improved UMS Route Surveillance								▮																				
EOD Comms Tech Demo								▮																				
Open Architecture for advanced user interfaces								▮																				
Battlefield Extraction - Assist Robot (BEAR)				▮																								
Chemical Biological Radiological & Nuclear (CBRN) Package for UGV & UAS				▮																								
Robotic Convoy Technologies				▮																								
Advanced EOD Robot System				▮																								
Autonomous Range Clearance				▮																								
Horizontal Mobility and Environmental Mapping								▮																				

Exhibit R-4A, RDT&E Schedule Details: PB 2011 Office of Secretary Of Defense		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 ITEM NOMENCLATURE** PE 0603709D8Z: *Joint Robotics Program*	**PROJECT** P709: *Joint Robotics Program*

Schedule Details

	Start		End	
Event	**Quarter**	**Year**	**Quarter**	**Year**
Joint Collaborative Technologies Experiment	4	2009	4	2009
Robotic Convoy Technologies- Warfighter Experiment	4	2010	4	2010
Networked Robotic Communication Solutions	4	2010	4	2010
Unmanned System Training - Improved UMS Route Surveillance	4	2010	4	2010
EOD Comms Tech Demo	4	2010	4	2010
Open Architecture for advanced user interfaces	4	2010	4	2010
Battlefield Extraction - Assist Robot (BEAR)	4	2009	4	2009
Chemical Biological Radiological & Nuclear (CBRN) Package for UGV & UAS	4	2009	4	2009
Robotic Convoy Technologies	4	2009	4	2009
Advanced EOD Robot System	4	2009	4	2009
Autonomous Range Clearance	4	2009	4	2009
Horizontal Mobility and Environmental Mapping	4	2010	4	2010