Exhibit R-2, RDT&E Budget Item Justification: PB 2012 Office of Secretary Of Defense										DATE: February 2011	
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 2010**	**FY 2011**	**FY 2012 Base**	**FY 2012 OCO**	**FY 2012 Total**	**FY 2013**	**FY 2014**	**FY 2015**	**FY 2016**	**Cost To Complete**	**Total Cost**
Total Program Element	14.568	9.878	11.129	-	11.129	11.218	10.665	10.364	10.940	Continuing	Continuing
P709: *Joint Robotics Program*	14.568	9.878	11.129	-	11.129	11.218	10.665	10.364	10.940	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, Collaborative Operations, Interoperability, Man-portable Unmanned Ground System Technologies, Manipulation 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.

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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 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total
Previous President's Budget	14.568	9.878	11.781	-	11.781
Current President's Budget	14.568	9.878	11.129	-	11.129
Total Adjustments	-	-	-0.652	-	-0.652
• Congressional General Reductions		-			
• Congressional Directed Reductions		-			
• Congressional Rescissions	-	-			
• Congressional Adds		-			
• Congressional Directed Transfers		-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Defense Efficiency Baseline Review	-	-	-0.106	-	-0.106
• Defense Efficiency - Report, Studies, Boards and Commissions	-	-	-0.296	-	-0.296
• Defense Efficiency - Contractor Staff Support	-	-	-0.234	-	-0.234
• Economic Assumptions	-	-	-0.016	-	-0.016

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2010	FY 2011
Project: P709: *Joint Robotics Program*		
Congressional Add: *Autonomous Machine Vision for Mapping and Investigation of Remote Sites*	1.600	-
Congressional Add: *Joint Robotics Training Program*	2.000	-
Congressional Add Subtotals for Project: P709	3.600	-
Congressional Add Totals for all Projects	3.600	-

Exhibit R-2A, RDT&E Project Justification: PB 2012 Office of Secretary Of Defense			DATE: February 2011
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 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total	FY 2013	FY 2014	FY 2015	FY 2016	Cost To Complete	Total Cost
P709: *Joint Robotics Program*	14.568	9.878	11.129	-	11.129	11.218	10.665	10.364	10.940	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 war fighter 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, Collaborative Operations, Interoperability, Man-portable Unmanned Ground System Technologies, Manipulation 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 war fighter'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 Programs ($ in Millions)	FY 2010	FY 2011	FY 2012
Title: Autonomous & Tactical Behaviors	2.012	2.651	2.829
Description: Development of vehicle onboard intelligence and tactical behaviors for greater autonomy. These technologies will increase the war fighters' ability to accomplish military task with greater effectiveness, while simultaneously reducing their risk to exposure and harm. ***FY 2010 Accomplishments:*** 1)Autonomous Navigation for Small UGVs (ANSU) project is to increase the war fighter's capability by developing, maturing, demonstrating and transferring autonomy technologies that will significantly increase the functional capabilities of small UGV systems. Project will transition to 0604709 to continue work at a higher technology readiness level. -Demonstration of the 2nd generation sensor suite on a representative platform capable of detecting obstacles of 6" or greater at a range of 3 meters. -Delivered of Micro-LIDAR September 2010.			

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012
2) Very Low Cost LIDAR delivered new low cost MIL ruggedized eye-safe LIDAR 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). -Completed work to modify Micro LIDAR hardware -Modified software modules -Developed Control Software -Developed Field-Programmable Gate Array (FPGA) H/W & S/W Configuration and begin FPGA Software Integration -Began LRIP production planning. ***FY 2011 Plans:*** 1)Very Low Cost LIDAR program deliver a low-cost sensor capable of providing textured 3D range maps with automatic terrain classification that provides significant new capabilities for the war fighter. This device can be used in the automation of ground vehicles or the data can be directly used by the war fighter to improve situational awareness. -Project will produce and assemble brass board sensor -Conduct Phase 1 Testing & Evaluation -Produce and integrate prototype sensor hardware and software, validate prototype sensor -Conduct Phase II Test & Evaluation -Complete LRIP production plan. 2) Adaptive Navigation Systems will develop and demonstrate an advanced modular and adaptive inertial navigation system for small UGVs. Project was previously funded from PE 0603711D8Z . -Procure/test new Inertial Measurement Units (IMU). -Development of software for integration of alternative IMU with Heuristics-enhanced Dead-reckoning (HEDR) system. -Develop coding for real-time execution onboard HEDR computer. -Review interface protocols. -Develop and code software for implementing standard interface protocol. -Develop software for using external sensors. -Testing of alternative embedded computers. -Rewriting of existing HEDR software to run on slower, possibly non-floating point computer. -Test system. -Build 2nd HEDR system 3)Collision Prediction Utilizing Traversability Models for Dynamic Environments will develop, demonstrate, and deliver one integrated sensor system that will detect, classify, track, and predict the motion of objects from a moving vehicle. The prototypes			

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012
will include sensors, computing, power distribution, and software to sense the environment. In addition to the prototype system, the government will be delivered government use rights for the hardware and software, a well documented C++ API with associated libraries developed under this project, and other third party libraries and relevant source code. -Terrain and road estimation module development. -Prediction module development. -Prototype hardware development and construction. -Perform prototype hardware validation and test. -Technology demonstration 1. -Critical Design Review 2. 4) Long Range Vision for Obstacle Detection from a moving ground vehicle (LROD) project is to increase the capability of unmanned ground vehicles (UGVs) to respond to positive, negative, and moving obstacles. Project previously funded from PE 0603711D8Z -Continue work on sensor processing algorithm development. -Complete early performance testing. -Prototype development. -Umanned ground vehicle integration. -Performance verification testing. -Final demonstration. -Provide final report.			
FY 2012 Plans: 1) Collision Prediction Utilizing Traversability Models for Dynamic Environments will develop, demonstrate, and deliver one integrated sensor system that will detect, classify, track, and predict the motion of objects from a moving vehicle. The prototypes will include sensors, computing, power distribution, and software to sense the environment. In addition to the prototype system, the government will be delivered government use rights for the hardware and software, a well documented C++ API with associated libraries developed under this project, and other third party libraries and relevant source code. -Terrain and road estimation module development -Prediction moduel development -Prototype hardware development and construction -Perform prototype hardare validations and test. -Technology demontstration 1. -Critical Design 2.			

Exhibit R-2A, RDT&E Project Justification: PB 2012 Office of Secretary Of Defense		DATE: February 2011
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012
4) Longe Range Vision for Obstacle Detection from a moving ground vehicle (LROD) project is to increase the capability of unmanned ground vehicles (UGVs) to respond to postiive, negative and moving obstacles. Project previously funded from PE 0603711D8Z -Continue early performance testing - prototype development -Unmanned ground vehicle integration -Performed verification testing -Hold final demonstration -Provide final report			
Title: Collaborative Operations ***Description:*** 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 war fighter 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 Accomplishments:*** 1) Human Robot Interface (HRI) for Explosive Ordinance Disposal (EOD) 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 Advanced EOD Robotic Systems (AEODRS) program. -Began development of an intuitive user interface (UI) for the AEODRS unmanned ground systems -Conducted and documented a task-based UI design requirements analysis of the EOD missions for the AEODRS family's small platform. -Documented expected changes to UI design requirements based on new AEODRS form factor for small robots and handheld Operator Controlled Unit. -Began documenting wireframe screen designs and control mappings. -Implemented wireframe designs in Multi-Robot OCU (software). -Documented results of user interface design tests. 2) High Speed Small Teleoperated Robot Command and Control will develop and demonstrate an advanced system to employ unmanned ground vehicle (UGV)-based stability technologies, low latency operator control and feedback, and necessary	5.380	5.153	4.861

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012
autonomy to support high speed assisted-teleoperation for small UGVs. High speed teleoperation is defined here as greater than 25 kph on improved surfaces and 15 kph on unimproved surfaces. This project addresses the problem of sub-optimized robotic performance during military operations due to a lack of operator situational awareness. The final demonstration will be a quantitative human-robot interface experiment. -Improved the suspension system on the RE2 Forerunner platform in order to improve stability at high speed. -Adapted existing vetronics retrofit package for the Talon to the Forerunner which includes local drive by wire,vehicle control, teleoperation sensing and wireless communications. -Adapted existing algorithms for model predictive control. 3) Urban Environment Exploration (UrbEE) The purpose of the Urban Environment Exploration (UrbEE) Project is to enable robotic platforms to more effectively operate within the challenging conditions of dynamic urban environments, with significantly reduced control burden on the operator. Project transitioned from PE 0603711D8Z as TRL level matured. -Began to 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 -Transitioning in-and-out of 3 single-story building structures. 4) Autonomous Navigation Environment (VANE) will facilitate virtual testing of Unmanned Ground Systems (UMS) ground vehicles for evaluation of onboard Autonomous Navigation Systems (ANS) and their associated hardware/software subsystems; supplement field evaluations at a reduced cost with better control and repeatability than can be obtained from physical tests to develop a geo-environmental process that can provide simulated sensor output during UMS maneuvers in complex environments; produce high fidelity three-dimensional vehicle terrain models to interact with ANS which are dependent on realistic synthetic images that include the effects of geo-environmental influences involving the ground surface and subsurface, vegetation, and meteorological conditions for sensor responses. -Identify technology transfer paths and implemented them throughout the program. -Integrate sensor models. -Integrate human signature representation and identification. -Integrate a representative autonomous navigation/control subsystem. -Began development of geo-typical urban and cross country environments. -Complete engineering level experiments and verification of VANE processes.			

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012
5) Urban Environment Modeling project will develop, mature, and demonstrate technologies that will provide rich 3-dimensional models of complex environments. Project demonstrated 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. -Demonstrated autonomous generation of a 3-D world model of a 2x2 city block area using fused sensor data. 6) Miniature 3D Spatial Phase Sensors has a two-fold purpose: (a) to mature the SPI sensor to TRL 6 for small UGVs and (b) to develop new techniques to take advantage of this new type of sensor data. The goal is to develop a camera system that is small, robust, and adaptable to various environments, and which can be readily paired with other 3D imaging techniques such as structure from motion (SfM), stereo vision, or laser. Project was previously funded from PE 0603711D8Z as TRL level matured. -Project developed and demonstrated 2nd generation SPI camera system -Reduced size from current prototype to 4x4x5 inches -Demonstrated several steps of the processing pipeline to an integrated FPGA or parallel processor -Image, surface normal vector, and 3D surface data output of at least 20Hz at least 4-megapixel resolution -Documented a functional external data interface (format TBD) -Demonstrated ranging of entire SUGV-relevant scene (1m3 scene in 360o) using key point ranges obtained through structure-from-motion techniques -Demonstrated basic navigable surface detection by analyzing surface shape and texture features of the terrain.			
FY 2011 Plans: 1) Human Robot Interface (HRI) for Explosive Ordnance Disposal (EOD) 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 Advanced EOD Robotic Systems (AEODRS) program. -Document wireframe screen designs and control mappings for medium and large platforms. -Common UI design implemented in MOCU (software) for family of systems. -Document results of UI usability tests. 2) High Speed Small Teleoperated Robot Command and Control will develop and demonstrate an advanced system to employ unmanned ground vehicle (UGV)-based stability technologies, low latency operator control and feedback, and necessary autonomy to support high speed assisted-teleoperation for small UGVs. High speed teleoperation is defined here as greater than 25 kph on improved surfaces and 15 kph on unimproved surfaces. This project addresses the problem of sub-optimized robotic performance during military operations due to a lack of operator situational awareness. The final demonstration will be a quantitative human-robot interface experiment. -Adapted exisiting algorithms for rollover governor. -Adapted exisiting algorithms for predictive display.			

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012
-Integrated all hardware modules on the Forerunner platform. -Conducted Capstone demonstration. * Urban Environment Modeling project will develop, mature, and demonstrate technologies that will provide rich 3-dimensional models of complex environments. Project demonstrated 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. -Demonstrated 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 * Miniature 3D Spatial Phase Sensors has a two-fold purpose: (a) to mature the SPI sensor to TRL 6 for small UGVs and (b) to develop new techniques to take advantage of this new type of sensor data. The goal is to develop a camera system that is small, robust, and adaptable to various environments, and which can be readily paired with other 3D imaging techniques such as structure from motion (SfM), stereo vision, or laser. Planned Accomplishments -Develop and demonstrate 3rd generation miniature SPI camera system reduced 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). ***FY 2012 Plans:*** * Counter Tunnel Exploitation will develop and demonstrate a prototype robotic system for Counter Tunnel Exploitation, Mapping and Characterization. The Tunnel Exploitation and Reconnaissance Robotic Apparatus (TERRA) system will meet the technology gaps and needs for the counter tunnel mission. This mission is currently performed by DoD warfighters for CONUS Defense Support to Civil Authority missions supported by U.S. Northern Command (USNORTHCOM).Project transitioned from PE 0603711D8Z as TRL level matured. Planned Accomplishments -Development of a umanned ground vehicle (UGV) mobility platform capable of insertion through a maximum 8 inch diameter bore hole.			

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012
-Demonstrate & transition UGV mobility platform prototype. -Development of 1st generation sensor suite with 3D Simultaneous Localization and Mapping (SLAM) and modeling. -Integration of mobility platform and support apparatus into system. -1st generation sensor suite and algorithms development. -Complete mobility platform development. -Bore hole support apparatus prototype development. -2nd generation sensor suite and algorithms development. -System integration and refinement. -Integrated system demonstration. * Collision Prediction Utlizing Traversability Models			
Title: Interoperability ***Description:*** 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 2010 Accomplishments:*** * 3D Visualization for Explosive Ordinance Disposal will develop, mature, demonstrate, and transition technologies that will provide the EOD UGV operators with an improved situational awareness and visualization capability for manipulation. Project transitioned from PE 0603711D8Z as TRL level matured and has transitioned to PE 0604709D8Z for FY 2011. Accomplishments -Demonstrated generation of a 3D model of a simple object from sensors mounted on an EOD class UGV. -Demonstrated generation of a 3D model of a moderately complex object from sensors mounted on an EOD class UGV. -Demonstrated an application that allows the operator to view the model from various perspectives.	1.000	-	-
Title: Man Portable UGS Technologies ***Description:*** 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	0.700	-	-

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012
robots in support of dismounted 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 2010 Accomplishments:*** *			
Title: Manipulation Technologies ***Description:*** 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 2010 Accomplishments:*** 1)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, 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. -Complete tradeoff analysis of the candidate arm morphologies on technical merit, value to the warfighter, and overall cost. Conformal End Effector 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. -Detailed Design -Modeling of the Design ***FY 2011 Plans:*** *-Demonstrate lightweight, agile conformal end effector that can grasp and support a 155mm cylinder weighing 110 pounds. -Design and fabricate three-fingered conformal end effector. -Utilize advance materials so hand weighs less than 5 pounds with target of 3.5 pounds. -Integrate end effector with manipulator developed under Highly Dexterous Manipulator project. -Demonstrate modularity of end effector interface with Highly Dexterous Manipulator interface and standard comms interface for high-level commands. ***FY 2012 Plans:***	1.250	1.324	1.875

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012
Projects in this technology area will be selected in July 2011.			
Title: Technology Transition / Transformation	0.626	0.750	1.564
Description: 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 programs of record, licensing to industry to foster COTS solutions, or integration onto fielded systems. ***FY 2010 Accomplishments:*** Funding will be utilized to assist in transition or transformation of the following projects but not limited to: * Autonomous Navigation for Small UGVs (ANSU) * Advanced Hydraulic Actuator * Unmanned Ground Vehicles for Small Unit Logistics ***FY 2011 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 * 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 Disposal Robots * Miniature 3D Spatial Phase Sensors * Collision Prediction Utilizing Traversability Models for Dynamic Environments ***FY 2012 Plans:*** * Counter Tunnel Exploitation			

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012
* Collision Prediction Utlizing Traversability Models Remaining projects in this technology area will be selected in July 2011.			
Accomplishments/Planned Programs Subtotals	10.968	9.878	11.129

	FY 2010	FY 2011
Congressional Add: Autonomous Machine Vision for Mapping and Investigation of Remote Sites ***FY 2010 Accomplishments:*** -Develope architecture design. ***FY 2011 Plans:*** -Physical demonstration of the proposed system.	1.600	-
Congressional Add: Joint Robotics Training Program ***FY 2010 Accomplishments:*** Job Analysis Verification: -Job Profile 3 More Positions (UGV, UAV, & USV). -Hold mini-DACUM review and revision. FDTC Credit Certificate: -Develop and Implement certificate program. -Develop online instructor lead Delivery of Certification and Certificate. -Develop online fully independent delivery of Certification and Certificate. -Deliver certificate & certification online. -Develop national two year college network. Protégé Support & Transition Program: -Support Protégé product transition needs. -Brief MP Program Managers on capabilities. -Continue development of small business tools. ***FY 2011 Plans:*** Two year Robotics Manufacturing Degree: -DACUM for 2 Year Degree. -Develop national two year college network offering two year high tech / robotics manufacturing degree program.	2.000	-

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	FY 2010	FY 2011
-Implement 2 Year Degree. -Develop online delivery of 2 year degree. Protégé Support & Transition Program: -Support Protégé product transition needs. -Expand MP program field support to other branches. -Develop Transition Training Program.		
Congressional Adds Subtotals	3.600	-

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total	FY 2013	FY 2014	FY 2015	FY 2016	Cost To Complete	Total Cost
• 0603711D8Z : *Autonomous*	11.020	8.791	9.710		9.710	10.071	10.281	10.520	10.857	Continuing	Continuing
• 0604709D8Z : *Robotics*	4.720	3.869	2.782		2.782	2.574	2.623	2.763	4.166	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 2012 Office of Secretary Of Defense		DATE: February 2011
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)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Total Prior Years Cost	FY 2011 Cost	FY 2011 Award Date	FY 2012 Base Cost	FY 2012 Base Award Date	FY 2012 OCO Cost	FY 2012 OCO Award Date	FY 2012 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Joint Ground Robotics Enterprise	MIPR	Multiple:Multiple	26.858	9.878	Sep 2098	11.129	Sep 2098	-		11.129	Continuing	Continuing	
		Subtotal	26.858	9.878		11.129		-		11.129			

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.

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Total Prior Years Cost	FY 2011 Cost	FY 2011 Award Date	FY 2012 Base Cost	FY 2012 Base Award Date	FY 2012 OCO Cost	FY 2012 OCO Award Date	FY 2012 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Joint Ground Robotics Enterprise	MIPR	Multiple:Multiple	-	-	Sep 2098	-	Sep 2098	-		-	0.000	0.000	
		Subtotal	-	-		-		-		-	0.000	0.000	

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.

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Total Prior Years Cost	FY 2011 Cost	FY 2011 Award Date	FY 2012 Base Cost	FY 2012 Base Award Date	FY 2012 OCO Cost	FY 2012 OCO Award Date	FY 2012 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Joint Ground Robotics Enterprise	MIPR	Multiple:Multiple	-	-	Sep 2098	-	Sep 2098	-		-	Continuing	Continuing	
		Subtotal	-	-		-		-		-			

Exhibit R-3, RDT&E Project Cost Analysis: PB 2012 Office of Secretary Of Defense		DATE: February 2011
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*

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Total Prior Years Cost	FY 2011 Cost	FY 2011 Award Date	FY 2012 Base Cost	FY 2012 Base Award Date	FY 2012 OCO Cost	FY 2012 OCO Award Date	FY 2012 Total Cost	Cost To Complete	Total Cost	Target Value of Contract

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)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Total Prior Years Cost	FY 2011 Cost	FY 2011 Award Date	FY 2012 Base Cost	FY 2012 Base Award Date	FY 2012 OCO Cost	FY 2012 OCO Award Date	FY 2012 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Joint Ground Robotics Enterprise Support	MIPR	TBD:TBD	0.203	-	Sep 2010	-		-		-	Continuing	Continuing	
		Subtotal	0.203	-		-		-		-			

	Total Prior Years Cost	FY 2011		FY 2012 Base		FY 2012 OCO		FY 2012 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	27.061	9.878		11.129		-		11.129			

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2012 Office of Secretary Of Defense		DATE: February 2011
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*

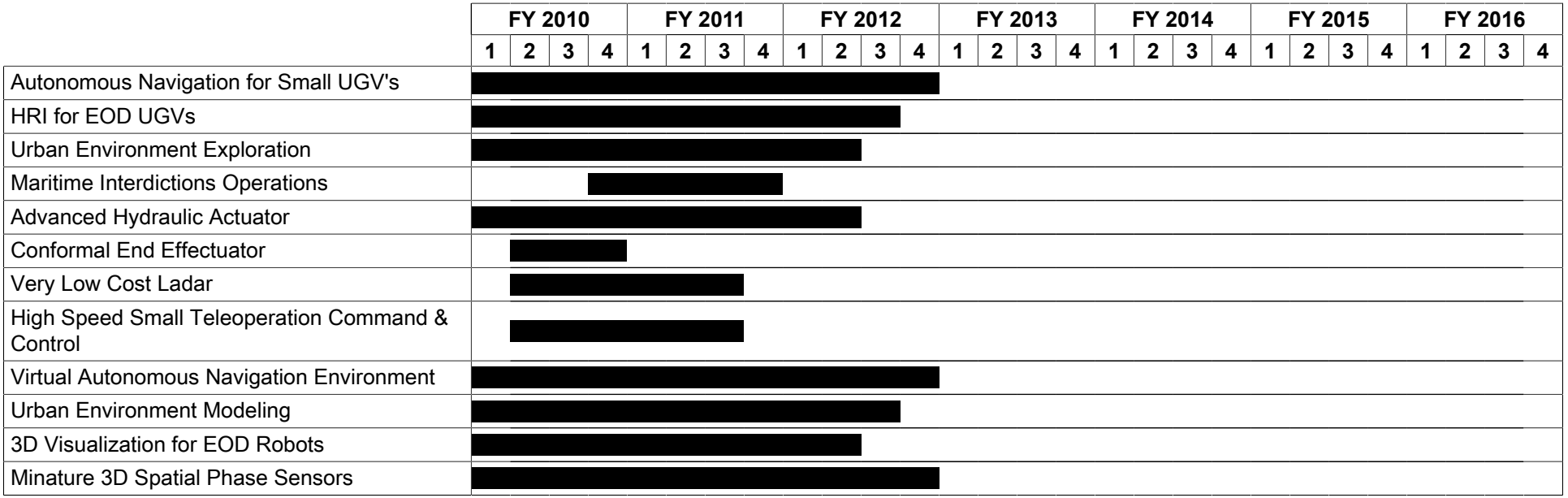

Exhibit R-4A, RDT&E Schedule Details: PB 2012 Office of Secretary Of Defense		DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 0400: *Research, Development, Test & Evaluation, Defense-Wide* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 ITEM NOMENCLATURE** PE 0603709D8Z: *Joint Robotics Program*	**PROJECT** P709: *Joint Robotics Program*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
Autonomous Navigation for Small UGV's	1	2010	4	2012
HRI for EOD UGVs	1	2010	3	2012
Urban Environment Exploration	1	2010	2	2012
Maritime Interdictions Operations	4	2010	4	2011
Advanced Hydraulic Actuator	1	2010	2	2012
Conformal End Effectuator	2	2010	4	2010
Very Low Cost Ladar	2	2010	3	2011
High Speed Small Teleoperation Command & Control	2	2010	3	2011
Virtual Autonomous Navigation Environment	1	2010	4	2012
Urban Environment Modeling	1	2010	3	2012
3D Visualization for EOD Robots	1	2010	2	2012
Minature 3D Spatial Phase Sensors	1	2010	4	2012