Autonomous Reconfigurable Mobile Robot (ARMR)
OLIN SCOPE TEAM 2011-2012

Olin College

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Mission

The current generation of man portable unmanned ground vehicles (UGV) often pose problems for researchers due to high unit price points and closed development architectures. Each UGV becomes a major investment for a research group and discourages heavy use under harsh field conditions, while closed software environments hinder necessary modifications. The Army Research Laboratory (ARL) approached the 2011-2012 Olin SCOPE Program with these problems in mind and asked the team to produce a man portable autonomous UGV for use as a research platform. The goals of the project focus on the development and production of a low-cost indoor/outdoor UGV that provides a modular interface for the rapid development of cutting edge software and sensor capabilities.

[Designed to meet the needs of the military research community]

Rugged Mobility

From urban cityscapes to overgrown woodlands modern research robots are faced with a varied and difficult terrain. ARMR features a track system capable of handling stairs, deep mud, tall grass, and everything in between.

ARMR has been designed from the ground up with ease of maintinence in mind. Access panels, easily removable tracks, and simple components make repair and improvement a breeze.

IP65 Environmental Rating
1.4 m/s Top Speed
110F Operating Temperature
65lbs *(With 2 batteries)*
Stair Climbing Capability

Tackles tough terrain with ease

Cost

Base	$15,000
Advanced	$23,000

[Reduce costs without sacrificing performance]

At 1/10 the cost of the competition with comparable functionality, ARMR looks to dominate the field of low cost, high-performance research platforms. By utilizing sheet metal construction and off the shelf components, cost is reduced across the board while maintaining system performance.
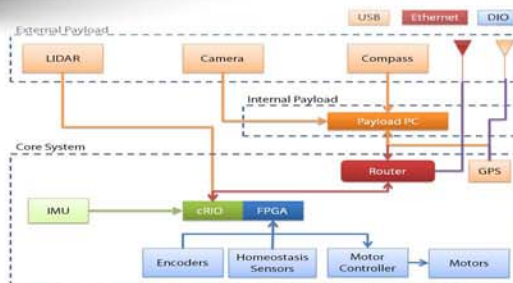
Intelligence

[Deliver robust intelligence capilities in a scalable, open source framework]

Example autonomous mission

To demonstrate the power of the ARMR architecture, the 2012 SCOPE team has implemented an advanced intelligence suite on an onboard small form factor PC. The included advanced OCU allows platform users to generate waypoint missions on the fly, see sensor inputs, display camera feeds, and control the platform from hundreds of meters away.

Once on its mission the platform avoids obstacles, follows GPS waypoints, and logs its position as it makes its way from A to B.

Expanding upon the Olin Robotic System Architecture, the ARMR architecture mimics the processing stages of the human brain. Elegantly sectioning processing tasks onto dedicated subsystems, the ARMR architecture ensures researchers flexibility of processing hardware, futureproofing the system and allowing for the easy integration of increasingly powerful computation systems as they become available.

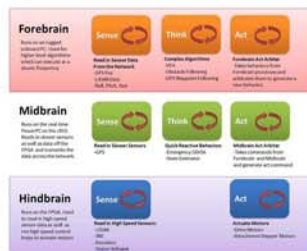*The ARMR architecture and its subsystems*

Designed with expandability and flexibility in mind, the ARMR architecture allows users to add and remove sensors, actuators, and computation ability as needed.

Sensors are hot swappable and any sensor with prexisting drivers for LabVIEW or ROS will work out of the box with the ARMR architecture.

Agnostic to its computation platform, high level behaviors can run on something as small as embedded ARM device or as large as server depending upon user requirements, readying the system to effortlessly harness the advancements of future technological progress.

Open, Modular Architecture

[Combining the power of ROS with the flexibility of LabVIEW]