

AVERT team shows autonomous extraction system for vehicles

April 29 2015, by Nancy Owano



A paper titled "AVERT: An Autonomous Multi-Robot System for

Vehicle Extraction and Transportation" is the result of research work and the AVERT project team is in for some momentous times ahead. Angelos Amanatiadis, Christopher Henschel, Bernd Birkicht, Benjamin Andel, Konstantinos Charalampous, Ioannis Kostavelis, Richard May, and Antonios Gasteratos are the members of the team, representing a collaboration among researchers from Greece, Germany, Switzerland and the UK. They say their project has reached a significant level of maturity and key design features have been finalized. They said the objective is entering production next year.

Anyone who has witnessed a towing service arriving to remove a car from a busy area or roadway can recognize the problem that the authors lay out in their paper. The authors in that paper propose their autonomous multi-robot system for the remote lifting and transportation of vehicles "with human intervention only in the decision making loop (which car to be moved and where to be transferred)."

They said that car lifting is time-consuming, demanding human intervention in the loop. "Their lifting and extraction configurations include towing, ropes and wheel lifter jacks."

They said that the current solutions for car removals are inadequate within confined spaces such as indoor parking lots, where the route clearance can often be performed only partially or even not at all, "as access with conventional towing equipment cannot be guaranteed."

Their automated system, in contrast, bears these advantages: "Automating the car [lifting](#) and transportation process will have a strong impact in several fields such as parking garages, emergency towing away services and [explosive ordnance disposal](#) by providing a faster and safer removal capability compared with the manual methods currently available."

Vehicles can be removed from confined spaces with delicate handling, swiftly, and in any direction, to a safer disposal point. This could reduce or eliminate collateral damage to infrastructure and personnel.

The paper describes the final prototype. They specifically sought in this paper to explore the validity and efficiency of the AVERT robotic system via experiments in an indoor parking lot, demonstrating [autonomous navigation](#), docking, lifting and transportation of a conventional vehicle.

The on-board sensors allow autonomous tire detection, docking and local obstacle avoidance. The bogies operate as a [swarm](#), without the need for any cables or links between them. They fit within the footprint of the car.

The authors said, "A complete vehicle extraction and transportation in an indoor parking lot was performed, where its experimental results confirmed the validity on autonomous navigation, docking, lifting and transportation."

A video shows their system at work, where the lifting robots are capable of omnidirectional movements. They under-ride the vehicle and dock to its wheels for synchronized lifting and extraction.

"The new version consists of four car transportation robots that can lift up and support a wheel of the car. Each robot slides two lift-bars under both sides of the wheel and then moves two racks on either side of a pinion to the opposite directions by rotating the pinion," according to the paper.

The authors pointed out that "The overall developed system applies reasoning about available trajectory paths, wheel identification, local and undercarriage obstacle detection, in order to fully automate the process."

An article about their work on Tuesday in *Popular Mechanics* traced their project: "The system was designed with law enforcement in mind, specifically as a way to remove cars from areas too [tight](#) for a tow truck or flatbed to navigate. Or worse, to gingerly move vehicles that might be rigged to explode. It's easy to see the potential beyond that though. Just look at the way AVERT can make a car move effortlessly sideways and imagine how that could change the logistics of shuffling around cars in a crowded parking garage."

Bottom line: The system can extract and remove vehicles from vulnerable positions. The system has a reversionary remote control, too, that allows the operator to override the autonomous system at any time.

Their paper will be presented at the International Conference on Robotics and Automation (ICRA 2015), next month in Seattle. This is an important event in the field of robotics and automation, presenting a range from exoskeletons to flying robots to, this year, the AVERT system, which has been included in the 2015 ICRA trailer as one of the upcoming highlights.

With that system, said the presenter, "robots are used to move cars out of tight parking spaces so that a [garage](#) can be used more efficiently."

The Autonomous Vehicle Emergency Recovery Tool (AVERT) started out as a research [project](#) in 2012, but 2015 appears to be a turning point. "AVERT was successfully demonstrated in March 2015 to five potential User nations and industrial partners. It is expected that AVERT could enter production in early 2016," according to the project site.

Another key application area beside lifting cars in garages is security. "In Europe, terrorism threatens horrific loss of life, extensive disruption to city transport and damage to commercial real estate. Vehicles provide an ideal delivery mechanism for improvised explosive devices because they

can be meticulously prepared well in advance of deployment and then brought into the Area of Operations."

The project site noted that current methods of bomb disruption and neutralization are hindered in the event that the device is shielded, blocked or otherwise cannot be accessed for examination. They said the role that AVERT could play would be to autonomously remove the blocking vehicles.

"Remote operation, self-powered and onboard sensors provides a new capability that can operate alongside existing technologies, thereby enhancing bomb disposal response, speed and safety."

More information: — AVERT: An Autonomous Multi-Robot System for Vehicle Extraction and Transportation, (PDF)

robotics.pme.duth.gr/docs/ICRA2015_Amanatiadis.pdf

— new.avertproject.eu/

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Citation: AVERT team shows autonomous extraction system for vehicles (2015, April 29)
retrieved 9 April 2024 from

<https://techxplore.com/news/2015-04-avert-team-autonomous-vehicles.html>

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