



## SUCCESS STORY

### Coimbra University Uses Robust, Reliable UGV for Rugged Mine-Clearance Robot.

Coimbra University in Portugal is one of the oldest universities in the world. With its distinguished academic stature and humanitarian initiatives in tow, the ISR Embedded Systems Lab in the Department of Electrical and Computer Engineering was provided a Husky Unmanned Ground Vehicle to develop methodologies for autonomous humanitarian demining.

#### Before Clearpath Robotics

Minesweeping is an extremely dangerous and time-intensive process that is mostly completed by human operators. Even if only a small number of mines remain undiscovered, the result can be catastrophic; it is estimated that over 20 thousand people lose their lives in mine-related accidents each year. With 110 million active landmines in the world, approximately 100,000 are removed each year - at this rate, it would take close to 1100 years to clear them all.

Dr. Lino Marques, Senior Lecturer in the Electrical and Computer Engineering Department at the University of Coimbra, and academic liaison for this project,

recognized the growing demand for robots in mine detection; robots do not tire, they are extremely thorough, and their cost is infinitely smaller than that of a human life. Nevertheless, current platforms on the market are not capable of handling rugged terrain where mines are often found; "there has been a constant interest in autonomous demining, however none of the proposed solution proved to be robust enough to go past the research phase," explains Marques.

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Robustness is a key component to autonomous demining as the system must perceive terrain characteristics and navigate across it. Likewise, customization capabilities and payload flexibility are crucial to accurately detect mines in the field. With this, the team at the University of Coimbra reached out to Clearpath Robotics for a Husky UGV because of its capacity to handle tough terrain challenges.



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## The Clearpath Advantage

Clearpath Robotics was thrilled to award the University of Coimbra with a Husky UGV through the 2012 Partnerbot Grant Program, inaugurated to support advancement in robotics research; the team was also presented with the special award for humanitarian contribution.

Clearpath Robotics was deeply connected to this project as the Company was founded with an initial focus on mine clearance. Not only did Clearpath share a passion for the project, they also understood many of the challenges that the team would encounter.

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Unlike other platforms the team had considered, Husky was a strong fit for this project because of its ability to handle rugged environments and versatile payloads; “without the Husky we would have had to develop our own mine detection robot from scratch, which we did not have the time or resources to do,” said PhD candidate and team member, Gonçalo Cabrita.

Additionally, the team was able to take full advantage of Husky’s open source compatibility; “the fact that Husky works with ROS out of the box is priceless. We integrated Husky with the remaining sensors and actuators in no time - thirty minutes after unboxing Husky, it was being tele-operated around the lab,” explained Cabrita.

## Results

University of Coimbra’s autonomous demining system met all project specifications upon delivery and enabled the team to enter field testing less than six months upon receiving the platform; “The team at Clearpath was extremely helpful, particularly with customizing our Husky - we’re way ahead of schedule,” said Cabrita.

Husky was outfitted with navigation and localization sensors, ground penetration radar, and a custom 2DOF robotic arm with metal detector that was easily mounted to the platform.



Information from the two sensors was combined to provide robust mine detection and a low false detection rate.

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To achieve this task, a stereo vision system was used to perceive rugged terrain, while depth imaging was combined with state-of-the-art point cloud perception algorithms.

The autonomous demining system has since been integrated into a larger FP7 European project called Tiramisu, where the ISR Embedded Systems Lab plans to continue exploring field tests with Husky.

Cabrita remarked, “Clearpath has been a huge help in our research.”



## About Clearpath Robotics

Clearpath Robotics, a global leader in unmanned vehicle robotics for research and development, is dedicated to automating the world’s dullest, dirtiest, and deadliest jobs. The Company serves robotics leaders in over 30 countries worldwide in academic, corporate, industrial, and military environments. Visit us at [www.clearpathrobotics.com](http://www.clearpathrobotics.com) to learn more or call us at **1-800-301-3863** to speak with an applications engineer.