

**Draft - 23 September 2005**



**Concept & Rules**

**- ELROB 2006 -**

1<sup>st</sup> European  
Land-Robot Trial  
2006

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# **1 Introduction**

## **1.1 Robotics<sup>1</sup> in the German Army**

Due to the reorientation of the Bundeswehr with an extended spectrum of tasks in conflict prevention and crisis management including the fight against international terrorism, the armed forces are heading for new demands. This holds also for most of the other European forces.

Robotics is one option for the intelligent substitution of personnel on highly dangerous and tedious operations. Such unmanned systems allow considerable improvement in the protection of soldiers. This applies to reconnaissance and combat operations as well as to handling or manipulating hazardous materials (e.g. NBC, mine detection). The employment of robot systems on the ground is imperative for protracted activities and/or for activities under threat.

Unmanned systems enable the soldier to enhance his protection considerably by substantially increasing the distance between him and the scene of operation. Furthermore, the employment of this technology allows accommodating the limited funds in the military sector and the increased need for opportunities of personnel cutbacks.

Against the background of this fundamental new situation and the permanent requirement for more economy of manpower and funds, the Bundeswehr and other European forces are consolidating and realigning their R&T activities in the area of robotics.

## **1.2 1<sup>st</sup> European Land-Robot Trial 2006 - (ELROB 2006)**

Facing the reorientation of the Bundeswehr and the increasing interest of other European armed forces the ELROB is conducted by the German Army in order to provide an overview of the European state of the art in the field of UGVs.

With regard to available capabilities, the organisers seek to promote innovative technical approaches that will enable the operation of unmanned ground vehicles (UGV). These ground vehicles will have to navigate in a predefined scenario in an intelligent manner to avoid or accommodate to obstacles including nearby vehicles and other impediments.

Therefore, ELROB is a field test of UGVs on realistic terrain and specific performance goals for distance and speed.

Representatives of military, border patrol, special forces, police, fire brigades, and civil protection agencies from the major European countries will attend.

The ELROB will be accompanied with a comprehensive exhibition covering a wide variety of robotics aspects.

As a result, ELROB will draw widespread attention to the technology issues associated with UGVs. Entrants should be motivated to overcome the obstacles to the realization of truly robust UGVs. The event challenges the most capable and innovative companies, institutions, and entrepreneurs from Europe to produce breakthroughs in capability and performance.

NOTE: This is not a challenge in the sense of a competition or contest. Nevertheless, it is a challenge in the sense of coping with the scenarios and requirements of the user.

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<sup>1</sup> All further statements in this concept relate exclusively to unmanned land-based robot systems (unmanned ground vehicle = UGV)

### **1.3 Date of the Event**

The ELROB will be held on 15<sup>th</sup> – 18<sup>th</sup> of May 2006.

### **1.4 Location of the Event**

The ELROB will take place in Germany at Hammelburg (Northern Bavaria) at the training area of the GE Infantry School.

### **1.5 General structure of the Event**

The organizers will invite the potential candidates to demonstrate the capabilities of their UGVs in demanding urban and open terrain scenarios. Each participant can subscribe to one or more scenarios. In advance to the event, the organizer will define and publish the scenarios in detail. This will allow the participants to adequately prepare for the environmental and technical conditions.

The event will last for three days with an additional preparation day for arrival, technical duties, and the possibility of pre-testing.

On the first day participants from the industry will conduct initial test runs on separate tracks. The participants are given the opportunity to present additional capabilities of their UGVs beyond the defined scenarios. Furthermore, users themselves will be allowed to operate the vehicles on display.

On the second day, universities, research institutes and the industry will carry out their runs and trials in the urban scenarios.

On the third day, universities, research institutes and the industry will carry out their runs and trials in the open terrain scenarios.

The exact organization and conditions of the trials will be governed by the set of rules published on the website. Essentially, every participant will be allowed to test and prepare his vehicle on a test track. In the setup phase, the vehicle will be put into operation and prepared for the start on the actual test track. The test run will be supervised by the organizers. If a participant has to abort the test because of technical difficulty, he will be allowed to repeat the test on request. Violations of the organizer's rules or instructions will result in exclusion from the event.

### **1.6 Preliminary Scenario Description**

#### **1.6.1 General description**

In all scenarios, the UGVs have to navigate in a given corridor over the terrain. Along the track, the UGVs have to count special marked objects while bypassing these.

#### **1.6.2 Open terrain scenario**

Name: Surveillance and Reconnaissance in open terrain

Terrain: Outdoor, mixed countryside

Task: Drive pre-designated route, detect points of interest (static and dynamic), identify, locate and record, report results to commander, return to station in timescale.

Environment: The maximum route (see definition appendix A) is no longer than 2000 meters. It may include paved roads, unpaved roads, trails, and off-road desert areas. Examples of obstacles include ditches, berms, washboard, sandy ground, standing water, fire, rocks and boulders, narrow underpasses, construction equipment, concrete safety rails, power line towers, barbed wire fences and cattle guards. In addition to the

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existing natural obstacles, the organisers might place obstacles (e.g. military equipment) on the route that may disable a vehicle if struck. These obstacles must be detected and circumnavigated by a vehicle to successfully complete the route. The terrain is wide enough for vehicles to bypass these obstacles if necessary.

### **1.6.3 Urban scenario**

Name: Tactical awareness in urban environment

Terrain: Urban, both outdoor and indoor

Task: Drive and explore street, detect building to explore, inspect outside of defined building, enter building, search one room (probably low light and collapsed), report results to commander.

Environment: The maximum route (see definition appendix A) is no longer than 500m. It may include paved roads and unpaved roads. Examples of obstacles include ditches, berms, washboard, standing water, fire, boulders, narrow underpasses, construction equipment, concrete safety rails, power line towers, barbed wire fences, and cattle guards. In addition to the existing natural obstacles, the organisers might place obstacles (e.g. military equipment) on the route that may disable a vehicle if struck. The buildings may be practically collapsed. These obstacles must be detected and circumnavigated for a vehicle to successfully complete the route. To enter the houses and floors there will be stairs and if necessary ramps.

### **1.6.4 EOD/IEDD/UXO scenario**

Name: EOD/IEDD: Detection and removal of EOD/IEDD in urban terrain

UXO: UXO detection in non-urban terrain

Terrain: EOD/IEDD: Urban, both outdoor and indoor

UXO: Outdoor, mixed countryside

Task: Navigate in pre-designated area, detect points of interest, identify, locate and record, report results to commander.

Environment: The maximum operational area is not larger than 10x30 meters. The maximum distance to the pre-designated area is no longer than 200m. The area may include paved regions, unpaved regions, trails, and off-road desert areas. Examples of obstacles include ditches, berms, washboard, sandy ground, standing water, fire, rocks and boulders, construction equipment, concrete safety rails, power line towers, barbed wire fences and cattle guards. In addition to the existing natural obstacles, the organisers might place obstacles (e.g. military equipment) in the operational area that may disable a vehicle if struck. These obstacles must be detected and circumnavigated by a vehicle to successfully complete the route.

Organiser: Prof. Dr. Yvan Baudoin (yvan.baudoin @ rma.ac.be)

## **1.7 Rules**

The development of revolutionary technologies is a key objective of the ELROB. Entrants (see definition appendix A) are invited to communicate directly with the organisers regarding any rule that restricts their ability to demonstrate technical achievement and innovative solutions to intelligent ground vehicle behaviour.

The Chief Judge Team (see definition appendix A) has the authority to modify the rules at any time. Reasons for rules modifications include, but are not limited to, the accommodation of promising but

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unexpected technical approaches that would have been prohibited by the rules and the exclusion of approaches that seek to participate without demonstrating the desired technical achievement in vehicle behaviour that is the purpose of the event. The organisers will announce any modifications to the rules with an e-mail to all entrants and a statement on the ELROB website under "Rules".

The Chief Judge Team may revise the schedule of the trials and provide interpretation of the rules at any time and in any manner that is required. The Chief Judge Team decisions regarding the rules are based on a number of factors, such as safety, legal compliance, fairness, trials goals, environmental protection, and efficient operations.

Decisions of the Chief Judge Team are final.

## **2 Eligibility**

### **2.1 Team Membership**

A team is comprised of the individuals identified to the organisers on the team roster. Only these individuals are team members (see definition appendix A). Each team must designate a single individual to serve as the team leader (see definition appendix A). The team leader must be at least 21 years of age and must hold European citizenship on the date of application to the ELROB, and must remain a citizen for the duration of the ELROB. Proof of European Citizenship for the team leader must be provided with the application as described in the application instructions. The organiser's representatives will verify these documents.

For each team, the team leader will serve as the primary point of contact with the organisers. The team leader must sign the application, must provide a Letter of Intent including the Liability Statement (see definition appendix A), and must be present at the meeting with all team leaders and the ELROB. The team leader will specify the team members. An individual may be the leader of only one team but team members may serve on multiple teams.

Team leadership may be transferred from the team leader to another eligible individual; there may be only one team leader at any time. Transfer of team leadership occurs when the organisers receive a Change of Team Leader form. The form is available from the organisers and must be signed by the existing team leader and the new team leader. The new team leader must also submit proof of citizenship.

Although the number of individuals listed on the team roster is not expressly limited, the organisers will impose a limit on the number of team members allowed into designated areas at the ELROB event. The organisers will communicate the limit to the team leaders upon notification of selection.

### **2.2 Non-European Participation and Sponsorship**

Individuals holding non-European citizenship are eligible to participate in the event on teams with a team leader who is a European citizen. Non-European corporations and non-governmental organizations may participate as team sponsors (see definition appendix A). Teams receiving funding or any form of support from non-European governments (see definition appendix A) or non-European governmental organizations are not eligible to participate.

### **2.3 Team Funding and Support**

The cost of developing, fielding, and insuring entered vehicles is the sole responsibility of the individual teams. The organisers will not provide funding for the purpose of ELROB entry or participation.

## **3 Vehicle Requirements**

### **3.1 Autonomous Vehicle Behaviour**

Participating vehicles might require autonomous behaviour and operation to complete ELROB. Fully remote controlled UGVs are also allowed. Nevertheless, Vehicles must be unmanned, and no animals are permitted onboard.

### **3.2 Vehicle Limitations**

The entry must be a ground vehicle that is propelled and steered principally by traction with the ground. The type of ground contact devices (such as tires, treads, and legs) is not restricted. The vehicle must not damage the environment or infrastructure at the ELROB route. Vehicle operation must conform to any regulations or restrictions imposed by the applicable land-use authority.

Maximum vehicle weight is 3 tons; those vehicles that weight more than 75 kilograms must be equipped with a recovery facility. The vehicle must be able to travel on asphalt pavement without damaging the pavement surface.

The participants should be aware of the fact that large and/or heavy vehicles will face difficulties in the urban scenario. The same holds for small/light vehicles in the out-door scenario.

### **3.3 Classified Data and Devices**

No classified data or devices may be used by a team in preparation for or during the ELROB.

### **3.4 Tethered Vehicle Systems**

Tethered subsystems that are designed to extend more than 10 meters above the surface must be painted to enhance their visibility to helicopter pilots that may need to land near a vehicle. Entrants are advised that the European Aviation Safety Agency (<http://www.easa.eu.int>) regulate the operation of moored (tethered) balloons. Entrants are advised that the route may be adjacent to utility and power structures and high-voltage power lines.

After the final location for the trials is announced, there might be additional local regulations that must be followed.

### **3.5 Vehicle Identification Number**

Each team will be assigned a unique identification number that shall be displayed on its vehicle on its sides, front, back, and top. The number should be either black or white and have a solid background that extends larger than the number. The colour of the background should contrast with the number such that the number is clearly visible and distinguishable from other signage or symbols on the vehicle. A vehicle that can operate when flipped over shall also display the number on its underside.

Teams are allowed to obtain sponsorships and to display advertising if such advertisements are not considered inappropriate by the Officials (see definition appendix A). The organisers ELROB logo must be displayed on each vehicle.

### **3.6 Vehicle Safety**

The organisers make no representation as to the safety of any vehicle entered in the ELROB notwithstanding any rule or the acceptance by the organisers of any application document, vehicle

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specification sheet (see definition appendix A), video demonstration, or any inspection or demonstration required as a condition of participating in the ELROB.

### **3.6.1 Radiated Energy Safety Standards**

#### **3.6.1.1 Laser Safety Standards**

All parties are responsible for maintaining laser safety standards. All trial vehicles must comply with all applicable safety regulations (see <http://europe.osha.eu.int/> for details).

After the final location for the trials is announced, there might be additional local regulations that must be followed.

#### **3.6.1.2 RF Radiation Standards**

All parties are responsible for maintaining RF safety standards. All trials vehicles must comply with all applicable safety regulations (see <http://europe.osha.eu.int/> for details).

After the final location for the trials is announced, there might be additional local regulations that must be followed.

#### **3.6.1.3 Acoustic Safety Standards**

All parties are responsible for maintaining acoustic safety standards. All trial vehicles must comply with all applicable safety regulations (see <http://europe.osha.eu.int/> for details).

After the final location for the trials is announced, there might be additional local regulations that must be followed.

#### **3.6.1.4 Wireless Emergency Stop (E-stop)**

It is the sole responsibility of the team to properly install an E-stop system in its vehicle.

Each E-stop must be fully functional for the participant to be eligible to participate in the ELROB.

The E-stop system has three modes: a RUN mode, a PAUSE mode, and a DISABLE mode. Teams must integrate the E-stop equipment so that the vehicle responds to the E-stop outputs as follows:

E-stop RUN mode enables the vehicle for movement.

E-stop PAUSE mode brings the motion of the vehicle to a prompt stop, with brakes applied to hold the vehicle even if it is on a slope. The vehicle should be ready to resume motion when the E-stop re-enters RUN mode.

E-stop DISABLE mode brings the vehicle to a prompt halt and shuts down all propulsion systems while actively applying and maintaining the brakes.

The required integration of the E-stop system enables the E-stop PAUSE mode to be cycled on or off so that the vehicle can be stopped and resumed during the trial. The E-stop DISABLE mode should be latched so that its state cannot be changed unintentionally after initiation.

Teams should anticipate that their vehicle may receive the E-stop PAUSE signal numerous times during the ELROB, and that the duration of any individual E-stop PAUSE event may be as long as several minutes. Teams should ensure that electrical connections to the E-stop are ruggedized and tested to provide assured electrical connectivity after exposure to adverse (damp or dusty) environmental conditions and a high vibration environment.

### **3.6.2 Manual Emergency Stop Unit**

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Each vehicle must be additionally equipped with an externally actuated manual emergency stop capability. Activating the manual emergency stop must promptly bring the vehicle to a complete halt in the E-stop DISABLE mode. At least one actuator and its labelling must be easily visible and accessible from anywhere around the vehicle. The manual emergency stop must be easy to identify and activate safely, even if the vehicle is moving at a walking pace. The operation instructions for manual emergency stop actuators must be clearly labelled in English and German. The instructions must not be interfered with by any other labelling or advertising.

### **3.6.3 Warning Devices**

Each vehicle shall be equipped with visual alarm that is activated according to the state of the E-stop system. The following is a summary of the required behaviour of the alarms.

E-stop RUN mode: Visual alarm on.

E-stop PAUSE mode: Visual alarm on.

E-stop DISABLE mode: No visual alarm.

#### **3.6.3.1 Visual Warning-Vehicle Operating**

Each vehicle shall display one or more flashing amber warning lights, the combination of which results in visibility 360 degrees azimuthally around the vehicle. The warning light shall operate when, and only when, the vehicle is in E-stop RUN or E-stop PAUSE mode. The vehicle may not commence movement until the warning light has been in operation for 5 seconds.

The warning light(s) shall comply with standards for warning lights and shall not produce light(s) than can be confused with those of public safety vehicles such as law enforcement, fire, or ambulance.

### **3.7 Towing Requirements**

Each vehicle over 75 kg must be designed to facilitate removal from the route should the vehicle be disabled.

These vehicles should have tow points front and rear, or if the vehicles design precludes towing, the vehicles should have hoist points. Wheeled or tracked vehicles must have a free-wheel mechanism that enables the wheels or tracks to spin freely in order to enable towing.

### **3.8 Position Determination Signals**

Challenge vehicles may be equipped to receive and process electronic position-determination signals (such as GPS) that are openly or commercially available to all teams. Position-determination signals that are neither openly available nor commercially available to all teams are prohibited.

Any costs associated with any subscription service are borne by the team.

GPS signals might not be available throughout the route at all times. GPS alone will not provide adequate navigation information to a vehicle. There will also be dust, smoke, and other visual obscurants on the route, and visual-spectrum-only sensing may not be adequate under these conditions.

### **3.9 Environmental Impact**

Any aspect of vehicle activity or operation that has an unacceptable impact on the environment is prohibited. These activities include destructive vehicle behaviour, the use of abnormally hazardous substances or materials, and generally reckless operation. Potentially hazardous equipment or

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activities must be identified to the organisers for review in the vehicle specification sheet and at the site visit.

Any explosives and/or ammunition are strictly forbidden!

### **3.10 Pre-Trial Testing**

Testing of trial vehicles or components is the sole responsibility of each team. The use of public lands for this purpose is at the team's own risk and must be in accordance with applicable laws.

## **4 Application Procedure**

### **4.1 Basic Requirements**

Applications will be accepted beginning June 2005. There is no fee for entry.

World Wide Web access, e-mail access, and basic word processing are necessary to complete and submit the application and for communication with the organisers of the ELROB staff.

The application consists of three parts:

Part 1: Team Application including Letter of Intent and Liability Statement

Part 2: Team information (team leader, proof of citizenship), selection of scenario (urban, non-urban, EOD/IEDD/UXO, all) and Vehicle/Exhibition Specification Sheet

Part 3: Technical Paper, Membership roster

Instructions for obtaining above mentioned ELROB application materials and for proper submission are on the ELROB website.

All parts of the application must be received by the organisers before the specified deadlines for a team to become eligible for participation in the ELROB.

Materials received after their respective deadlines will not be considered, and will be destroyed by the organisers.

Application Part 1 and 2 must be received by the organisers no later than 14<sup>th</sup> of October 2005

Application Part 3 must be received by the organisers no later than 11<sup>th</sup> of November 2005.

Notification of team selection is 01<sup>st</sup> of December 2005

### **4.2 Submission Procedures**

Application documents must be submitted using the transmittal instructions on the forms. The receipt of application documents will be acknowledged by the organisers. Delivery information and official time of receipt will be recorded as follows:

Application materials remitted using any kind of delivery service should be addressed to:

Heeresamt I 1 (1)  
OTL i.G. Fries  
Brühler Straße 300  
50968 Köln  
Germany  
Tel.: +49-(0)221-9371-3911

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Fax.: +49-(0)221-9371-2350

Email: [ELROB2006@bundeswehr.org](mailto:ELROB2006@bundeswehr.org)

The time of receipt for each package will be logged as recorded in the organiser's mailroom. The time of receipt for each document will be logged by the organisers e-mail system.

### **4.3 Qualification Process**

All steps of the qualification process must be completed by teams that wish to take part in the ELROB. A team that has submitted application parts 1 and 2 the application by the deadline and has received acknowledgement from the organisers becomes an ELROB entrant. A team must submit application part 3 of the application by the deadline in order to remain an entrant.

### **4.4 Additional Materials**

The organisers may request additional information from the teams after the receipt of the application materials. Examples of additional required information include an updated team roster, photographs of the Challenge vehicle, and a photograph of the team.

### **4.5 Team Promotional Material**

Contact information for each team including team leader name, team e-mail address, and team URL will be posted on the ELROB website to enable contact from potential sponsors, other teams, and media. Promotional materials provided by the teams such as the team description paragraph, team sponsor list, team picture, and vehicle picture can also be published on the website. Following the conclusion of the ELROB, team technical papers (see definition appendix A) will also be published on the website.

### **4.6 Technical Papers**

A technical paper describing the vehicle of each participant must be received by the organisers by 01.October 2005. A description of the subjects that must be addressed in the technical paper will be available on the ELROB website. The organisers will withhold the technical papers until the conclusion of ELROB, at which time the papers will be made available to the public.

Other than the required technical paper and information already in the public domain, the organisers will not publicly release information regarding a team's technical approach without permission from the team leader.

The organisers claim no intellectual property (IP) rights from entrants. All trade secrets, copyrights, patent rights, and software rights will remain with each respective team.

## **5 Procedures ELROB**

A detailed schedule will be available on time.

### **5.1 Departure Area**

When instructed to do so, each team must move its vehicle promptly to the start chute (see definition appendix A). Trial vehicles start in sequential order at specified time intervals. Start order is announced at the web page.

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Each vehicle must be enabled for operation within 5 minutes after entering the start chute. Vehicles must be prepared to wait in E-stop PAUSE mode in the start chute for up to 30min..

Before each start, the vehicle is in E-stop PAUSE mode. At the designated start time, the E-stop is switched from PAUSE to RUN and the vehicle must depart the start area promptly after the mandatory 5-second delay for the visual alarm.

## **5.2 Vehicle Control**

An official may place any vehicle in E-stop PAUSE mode for safety or operational reasons. The official later returns the vehicle to E-stop RUN mode so that it may continue.

ELROB officials must have unrestricted access to the UVG's E-stop functionality during actual trial run(s) and even during the preparation.

If a vehicle does not progress within 5 minutes of resuming E-stop RUN mode the trial is aborted. The team may apply for a second attempt.

If dangerous or destructive behaviour by a vehicle is imminent, an official places the vehicle in E-stop PAUSE mode and the trial is aborted. If necessary to stop it, the official places the vehicle in E-stop DISABLE mode. The team may apply for a second attempt.

The organisers will take measures to stop a vehicle that does not respond promptly to an E-stop command, even if these measures may result in damage to the vehicle.

## **5.3 Trial Route**

A team may not physically intervene in any aspect of vehicle operation or physical participate in vehicle tracking from the time the vehicle clears the start chute until it is returned to the team. A vehicle is returned to the team after the trial is aborted or after it clears, the arrival line (see definition appendix A). Refuelling of vehicles is not permitted.

Teams may not operate any ground vehicles or position any team members along or near the route during the ELROB except at designated viewing areas.

While vehicles are on the route, the organiser's officials might follow the vehicle.

Each vehicle must remain within the route boundary from its departure from the start chute to its arrival at the arrival zone (see definition appendix A).

If a vehicle is in E-stop RUN mode and the vehicle does not progress for longer than 5 minutes, the trial is aborted. The team may apply for a second attempt.

If the organiser's officials determine that it is not possible for a vehicle on the route to finish in less than 10 minutes while travelling at the maximum speed limit over the remaining segments of the route and allowing the vehicle to continue would hinder ELROB operations, the trial is aborted. The team may apply for a second attempt.

### **5.3.1 Route Definition**

Per scenario, three route definitions will become available over the time:

1. preliminary general description of the scenario and the route
2. detailed description of the scenario and the route
3. map and personal inspection of the route through the team leader prior to the ELROB

## **5.4 Obstacles**

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The vehicle must avoid collisions with any obstacle, moving or static, on the route. The organisers will place obstacles along the route to test obstacle avoidance capabilities. Incidental or non-damaging contact with obstacles may not result in trial abortion.

## **5.5 Intentional Interference and Damage**

Intentional interference with other vehicles is prohibited. Intentional interference is any activity that, in the opinion of the Chief Judge Team, is intended to degrade another vehicle's ability to compete.

Any team responsible for the intentional damage of property that does not belong to that team may be excluded from the event. Intentional damage includes damage that occurs as a result of failure to prevent damage that could have been foreseen and includes damage that adversely and materially affects the performance of another team. The Chief Judge Team will have the final say in all matters involving damage.

## **5.6 Improper Vehicle Contact**

A team may not make or cause physical contact with its vehicle after it has departed the start chute and before it is returned to the team. Physical contact includes indirect contact with tools.

## **5.7 Jettisoning Material on the Route**

Except for normal by-products of power generation, the intentional jettison of any material from a vehicle is prohibited and may result in exclusion from the event. If a portion of a vehicle unintentionally falls from the vehicle while on the route, the organisers will notify that team, and the team is responsible to recover such debris once all qualified vehicles have cleared the affected area.

A smokescreen or any other obscurant intentionally discharged from a vehicle is specifically prohibited.

## **5.8 Arrival Area**

After a vehicle crosses the arrival line, it is impounded for an inspection. Teams may not interact with their vehicle until it is released by an organiser's official.

## **5.9 Abortion of trials**

A vehicle may not continue on the route if the trial was aborted. The organisers will coordinate with the team to recover the vehicle from the route. Teams will enter the route area only when so directed by the organiser's officials. The team may apply for a second attempt.

# **6 Frequently asked Questions (FAQ)**

## **Organisational Questions**

### **Do I have to book the flight / hotel / etc. myself?**

Yes, please see the "Links" for travel support information.

### **What happens if it starts raining?**

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Since ELROB is a realistic outdoor trial it will continue even when it is raining.  
The Chief Judge Team might interrupt the trials if it is pouring.

**Where the heck is Hammelburg?**

In the very north of Bavaria approx. 125Km east from Frankfurt am Main

Closest highway is: A7

Closest airport is: Frankfurt a.M.

Closest railway station: Hammelburg

GPS: 009'53"22.80 East 050'06"57.80 North

Map: see Downloads

**We are from Russia / Switzerland / Norway, can we participate?**

Yes.

European citizenship refers to the continent not to the E.C./E.U.

**Can I apply only to the trials?**

Yes.

**Can I apply to the exhibition and the trials?**

Yes.

**Will I get further / more detailed information when I apply for the trials?**

No, all information that is available will be published on the web site.

There is no need for fictitious applications.

**What happens if I do not send the notarized form by 01.October 2005?**

You will not be able to participate in ELROB 2006.

There will be a page with names and details why the application failed.

**Do we receive a confirmation that our team has been selected for the trials?**

Yes.

Notification will be at 01.Dec 2005

**I am a journalist where can I get additional information on ELROB?**

You will find most of the information regarding the event on the web site.

Please read the documents (e.g. the rules) carefully.

If you use the documents or parts of them or pictures from the web site please cite correctly!

**The rules are subject of change! Please see [www.elrob2006.org](http://www.elrob2006.org) for current version!**

You might want to read the statements under the link "Contact".

If you have any further questions feel free to use the provided contact.

### **Why do we need a European "Grand Challenge"?**

The DARPA Grand Challenge is open for US lead teams only.

### **What is the difference between the DARPA Grand Challenge and ELROB 2006?**

ELROB is a trial!

It allows participants to demonstrate the capabilities of their UGV in realistic scenarios and terrains.

### **Why is there no prize money?**

Again, ELROB is a trial not a challenge in the sense of a competition or contest.

Nevertheless, it is a challenge in the sense of coping with the scenarios and requirements of the user.

### **What kind of spectators will attend ELROB?**

Representatives of military, border patrol, special forces, police, fire brigades, and civil protection agencies from the major European countries will attend.

### **How will the scenarios look like?**

Please see the "Scenarios" link.

### **How much does the notarization cost?**

In Germany approx. 15 Euros.

## **Technical Questions**

### **Have the routes/scenarios been tested?**

All routes/scenarios have been tested with commercial of the shelf equipment.

The dimensions of the robot were 90x65x95 (LxWxH in cm) and weight 65Kg.

### **Must the UGV be fully autonomous?**

No.

### **Are fully remote controlled UGVs allowed?**

Yes.

**The rules are subject of change! Please see [www.elrob2006.org](http://www.elrob2006.org) for current version!**

**Will there be always line of sight between the UGV and the operator station?**

No.

Buildings as well as terrain and foliage will obstruct line of sight and radio communication.

**Can we use relays for the communication/video link?**

Yes, there are two mutually exclusive ways for doing so:

You may deploy one relay manually before the trial.

OR

You may deploy up to 10 relays from the vehicle during the trial.

**What is the permitted maximum height of the individual antennas?**

The maximum height is 3 meters measured from the ground to the top of the antenna.

**Will it be possible to get more information on the route (e.g. GPS data) before the event?**

No.

Also it is not possible and not allowed to get on the trial site before the event.

Any violation (even the attempted) will be published and result in exclusion from the event.

## 7 Appendix A: Definitions

### *Arrival Zone*

The arrival zone is that area behind the arrival line, and within the boundaries designated for that purpose.

### *Arrival Line*

The arrival line is a line at the end of the route.

### *Chief Judge Team*

The Chief Judge Team is a group of officials designated by the organisers as such. The Chief Judge Team is the final authority on all matters referred to in the rules, and on all matters affecting the operation of the ELROB that are not explicitly referred to in the rules.

### *Commercially Available*

Commercially available refers to services or materials that are sold, leased, or licensed to the general public.

### *Departure Area*

The departure area is that area before the departure line, and within the boundaries designated for that purpose. The departure area is not part of the route.

### *Departure Line*

The departure line is at the beginning of the route. It defines part of the boundary of the departure area.

### *Departure Signal*

The departure signal is given sequentially to each vehicle by enabling it for operation via the RUN mode on the E-stop system.

### *Entrant*

An entrant is a team that meets the eligibility requirements and has satisfactorily submitted parts 1, 2 and 3 of the application (receipt of which has been acknowledged by the organisers).

### *Government*

For purposes of these rules, government refers to national or international governing bodies and all official agencies that are directly responsible to them. It includes the European Governments, all European military organizations, the European Union, and all other non-European governments and non-European government agencies. Government explicitly does not refer to sub-national organizations such as state or local governments.

### *1. Europäische Leistungsschau Robotik 2006 (ELROB)*

German expression for “1<sup>st</sup> European Land-Robot Trial”

### *ELROB Website*

Application forms and the most authoritative and up-to-date information about the ELROB can be obtained at the URL: <http://www.elrob2006.org>

### *Lateral Boundary Offset*

The lateral boundary offset (LBO) is the distance in any direction from the track line (including a radius at the end points) that defines the corridor in which vehicles are permitted to travel. The width of this corridor will vary according to safety, environmental, and passing considerations.

**The rules are subject of change! Please see [www.elrob2006.org](http://www.elrob2006.org) for current version!**

### *Media Representative*

A media representative is anyone who is accredited by the organisers as such.

### *Official*

An official is any person designated by the organisers for the purpose of administering or monitoring any aspect of the ELROB.

### *Openly Available*

Openly available refers to services or materials that are available to anyone without charge, such as software that is available for public download or GPS signals.

### *Qualification Process*

The qualification process refers to the sequence of steps a team must successfully complete to be selected for the ELROB. This includes submission of the application, submission of an acceptable vehicle specification sheet, and submission of an appropriate technical paper.

### *Route*

The routes consist of a departure line, an arrival zone, and a lateral boundary. The route is the area included within boundaries specified by the organisers in the route definition.

### *Rules*

The rules posted on the ELROB website are the official governing set of regulations and guidelines of the organisers ELROB. The Chief Judge Team is the final authority on all rules and all aspects.

### *Liability Statement*

Team leaders are required to sign, have notarized, and sent to the organisers a document stating that: 1) the team applies for the ELROB2006; 2) confirms the commitment to participate in the event ELROB 2006; 3) the team holds harmless, and indemnify the German Government, including the Ministry of Defence (MoD) and its employees, and those contractors and their employees acting on behalf of the German Government for the ELROB 2006. This agreement to hold harmless and indemnify shall be for any and all claims of liability whether by reason of injury or death of any person, or of damage to the property of the Team, or another, arising from, or connected to the participation in ELROB 2006. Forms are available on the ELROB website as part of the application.

### *Start Chute*

The start chute is an area at the ELROB directly before the departure line. A team must place its vehicle in the start chute prior to enabling it for operation.

### *Spectator*

A spectator is any person who is not a team member, official, or media representative. During the ELROB, areas will be designated for spectators.

### *Team*

A team comprises two parts: a qualified team leader and any other individuals who have been appropriately designated by the team leader as team members in the application. Corporations or other organizations may participate as sponsors only. Team members may contribute their individual labour, individually owned materials and equipment, and individual funds to a team. Individuals holding non-European citizenship may participate only as members of a team led by a European citizen. Modifications to the team roster may be submitted to the organisers with submission of the technical paper.

**The rules are subject of change! Please see [www.elrob2006.org](http://www.elrob2006.org) for current version!**

#### *Team Leader*

A team leader is the individual European Citizen identified to the organisers during the application process responsible for the following: primary point of contact for team communication with the organisers, signatory of the Certification of Team Funding and Support, signatory of the Liability Agreement, presence at all stages.

#### *Team Member*

A team member is a team leader or individual who has been pre-designated by the team leader as a team member in the application process.

#### *Team Sponsor*

A team sponsor is an organization that contributes labour, materials, services, equipment, or funds to a team.

#### *Technical Paper*

A formal document describing the engineering details of the vehicle design and operation, a technical paper is required for all teams. Final versions of these Papers will be published on the organisers website following the conclusion of the event for purposes of information interchange. Information on technical paper content and required format will be available on the ELROB website.

#### *Vehicle*

A vehicle is the unmanned ground vehicle system that has been entered by a team for the ELROB.

#### *Vehicle Specification Sheet*

The vehicle specification sheet is a mandatory part of the application, and part of the qualification process. This submission describes the basic capabilities of the vehicle for planning, safety, and selection purposes. This form is available on the ELROB website. Failure to complete this form properly and submit it before the deadline may result in disqualification.