

Eurathlon 2013

Scenario Application Paper (SAP) – Review Sheet

Team/Robot ENSTA Bretagne

Scenario Search and rescue in a smoke-filled underground structure

For each of the following aspects, especially concerning the team's approach to scenario-specific challenges, please give a short comment whether they are covered adequately in the SAP.

Keep in mind that this evaluation, albeit anonymized, will be published online; private comments to the organizers should be sent separately.

Robot Hardware

6-robot swarm solution, custom-made platforms, tracked, with variable geometry. Unfortunately, no pictures.

Processing

All vehicles and the control station use linux and custom Java software.

Communication

WLAN, leading robot uses the others as mobile routers/relay points.

Localization

Mapping based on visual odometry and a relative localisation based on direct sight.

Sensing

Custom-made acoustic camera and a classic visual camera, ultrasonic range finders.

Vehicle Control

Main robot directly controlled by an operator, others are automatically guided by some "leader-follower" approach.

System Readiness

The system is not functional yet.

Overall Adequacy to Scenario-Specific Challenges

A combination of ultrasonic and visual camera is planned to handle the problem of smoke and limited sight. In case of a loss of connection, all vehicles return to the last known connected positions.

Since this is a student project and not yet functional, the team will probably face severe difficulties during the trial. Anyhow, it is definitely worth giving them a chance.

The SAP, however, is very short. Even for work in progress, it should be possible to give some more details or provide some pictures. Since the SAP procedure is new for Eurathlon 2013 this might be acceptable, but for the following events it would clearly be insufficient.

EURATHLON : Scenario application Paper

ENSTA Bretagne team

Search & Rescue in smoke-filled underground structure

The ENSTA Bretagne team works on a swarm robotic solution, based on 6 robots. We will be remotely piloting the head robot, while the other 5 robots will divide themselves all along the way, to provide a good wireless connection between the operator, and the head robot. The vision will be acquired through both a custom-made acoustic camera and a classic visual camera.

The head robot is a custom made one, with the major capability of having a variable geometry, which gives it the ability to pass above small obstacles. It will be on tank tracks, suitable for both outdoor/indoor & rough terrain. Its main components are fully protected from water, giving it the ability to survive in wet areas. It has an electrical autonomy around 80min.

About processing, all of the vehicles and the control station use linux distributions and Java softwares programmed by ENSTA Bretagne students.

About the communications, the robots share a WLAN, the main robot using the other ones as routers to ensure the communication between it and the control station.

Due to the impossibility of using GPS, the robots will be using two different systems for their localisation, visual odometry and a relative localisation based on direct sight. All of the robots are 4x4 (the head one is even a 6x6)

Sensors are spread on the sides of the main robot (ultrasonic range finders mainly).

The main robot will be directly controlled by an operator at the control station, while the other robots will stay on the road "written" by the main one, so the issues about vehicle control are somehow treated.

The whole system is not fonctionnal yet, due to all the team members being students of the ENSTA Bretagne.

About the SAR in smoke filled underground mission, the main issue is about the detection of OPIs. This is treated through using simultaneously a ultrasonic camera & a visual camera, eliminating the issues about "non visible obstacles".

A mapping program will be used meanwhile, taking into account the orientation of the robot. Last but not least, if any of the robot lose contact, it raises an alarm on the control station and all the robots come back on their last connected position.