TU/e

iNNOVATION SPACE

Challenge name	Autonomous information network
Challenge owner	Sita Robotics x TMC
	X Company ☐ Research ☐ Student team
	Bart van Liere
Email challenge owner	
Phone challenge owner	
Preferred way to contact	X email ☐ Phone call X SMS / what's app ☐ Other; …
Brief summary	We are building robots that can explore dangerous environments before people have to enter. In the near future, this robot will have the need for more autonomous features, enabling the use of more robots simultaneously and therefore creating a higher efficiency. For this concept the controller needs to be redesigned and research needs to be done what is needed for edge-computing on the robots and which computing is needed for this idea. Besides a more high-level design is needed to see what capabilities we would like to give to the client and what we can do autonomously.

About the challenge owner

Sita Robotics is a young company, aimed at creating an accessible robotic information platform. In order to help our customers make difficult decisions in harsh terrain, we believe that robotics are for everyone and that all decisions should be made with sufficient information. This information should enable better and safer decisions resulting in a safer and more efficient workspace. Within 5 year we aim to have a live platform accompanied with multiple type of robots acquiring all needed information.

Challenge description

Our current solution consists of a straight forward, remotely controlled, system of robots that is centralized on a platform (controller). This solution works when the focus is only on 1 or 2 robots. In order to create a bigger system of multiple robots we need to look at a 'hive'-like structure, demanding a more autonomous system. What this challenge consists of is looking at this 'hive' like structure and finding the needs for this, as well as implementing a very low level MVP (this can be with nodes as robots). With this implementation we want to achieve a higher efficiency of our robotic network creating situational awareness.

Possible components in this challenge are:
- Looking at the computing power needed for more autonomous behavior, What is done on the controller, what is done on the edge (robots)?
- Looking at the broad concept and determining what needs to be autonomous and what is essential to let the client do.
- Looking into UX design and controller design .
- Designing and creating a (working) prototype (TRL 3).
- Explain whether something already exists that students will build on.

We have a current system which is remote controller, but capable of monitoring multiple systems. Besides we have multiple use cases within multiple industries (and enthusiastic partners!)

TECHNOLOGY TO SAVE LIVES

Speed

The mission: "Lifesaving information, available for everyone, in every situation."
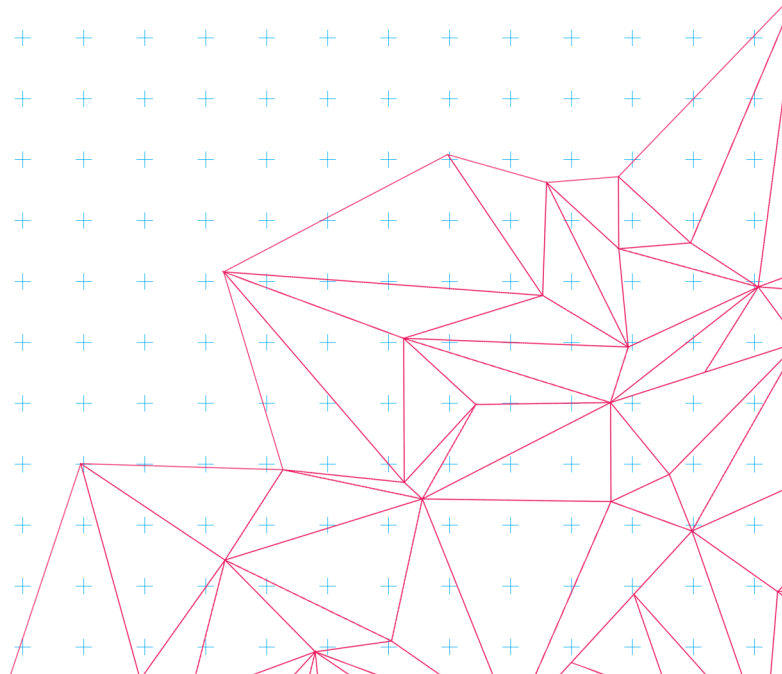
Input and involvement of challenge owner

In the project group we will function as a coach and help keep track of the overall picture. A (bi)weekly moment should be planned together with the students.

When this problem is solved we have a better method and view on the future. This will help reaching the next level of our concept.

Resources

For the students it is necessary to have access to a computer and to be able to have a high level view of the concept (which we will provide).

We offer expertise in designing and building robotic systems, information about our clients and potential application areas, and a workplace where students could meet and discuss with us and our colleagues.

Roles of different disciplines (only for ISBEP)

Discipline	Description
Automotive Technology	The robot needs to be able to move around in a physical space autonomously. AT students can help in optimizing the physical movement that can be controlled by the autonomous system.
Biomedical Engineering	
Architecture, Urbanism and Building Sciences	Knowledge about the built environment can be incorporated in the software architecture of the system. Understanding the types of environments in which the robots will operate can assist programmers in making the robots take appropriate decisions when sensing certain environmental factors.
Computer Science and Engineering	An IT system needs to be designed and implemented that allows for a hive of robots to work together autonomously, collect data and translating that into useful information for human users.
Data Science	A hive of robots will be collecting data from many different sensors, both sensing the robots' movement behavior and scanning its environment. These data need to be mined for important pointers.
Electrical Engineering	The robots have a complex electrical system with sensors and actuators that need to be powered autonomously.
Industrial Design	Help with the idea behind the whole concept and support within the whole process, UX design and a sharp concept.
Medical Sciences and Technology	
Psychology and Technology	Think along with the design of the user interface. What decisions can be made autonomously and how can those be translated into an interface to be used by human users?
Chemical Engineering and Chemistry	
Sustainable Innovation	
Industrial Engineering	
Applied Physics	Robots that can move in many directions will encounter difficulties when they have to do so autonomously. How can we apply knowledge from motion physics to the further development of the system, allowing it to take behavioral decisions autonomously.
Applied Mathematics	
Mechanical Engineering	The control of the system, hive mind and other control dedicated task within this concept.