TU/e
INNOVATION SPACE

Challenge name	Farming of the future
Challenge owner	Neways
	X Company ◻ Research ◻ Student team
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Email challenge owner	
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Preferred way to contact	X email ◻ Phone call ◻ SMS / what's app ◻ Other; …
Brief summary	The claim on natural resources, the environmental consequences and cost of producing our food are to be well balanced. Precision Farming is one option for this. Preparing of soil, providing nutrition and water and weeding and harvesting at the right time, we can optimize the farming processes. Precision Farming goes one step further and optimizes these measures based on the actual status of plants. The challenge is: how can advanced technology help to implement Precision Farming.

About the challenge owner

Neways is an international innovator in electronics for smart mobility, connectivity and semicon solutions. With more than 50 years' experience and strong engineering power, we are proud to act as technology innovation partner for the most demanding customers in the industry. Neways develops and produces electronics that facilitate major trends around global ESG themes. Our team of more than 2,500 specialists across the Netherlands, Germany, USA, China, Czech Republic and Slovakia enables future solutions for EV charging, electric power trains, digitizing health solutions, sustainable agriculture, producing microchips and more.

Challenge description

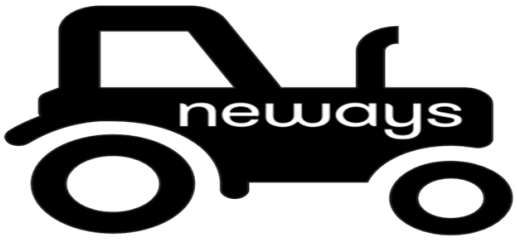
Farming is transferring from “harvest what nature provides” to “efficiently supply the world with food”. In this transfer the claim on natural resources, the environmental consequences and the cost (and affordability) of our food are to be balanced. Precision Farming is one of the options for creating this balance. By preparing the soil at the right time, by providing the exact right amount of nutrition and water to plants and animals, by weeding at the right time with the right means, mechanical and/or chemical, and other measures we can optimize the output of the farming processes. Precision Farming takes this approach one step further and optimizes these measures based on the actual status of plants and animals.

One of our customers produces fertilizers as well as crop dusting equipment. These machines are pulled by a tractor or self-propelled and distribute solid fertilizer or a fluid (normally water with chemical additives) over a field that may hold crops or grass. The challenge now is: how can advanced technology help to implement the Precision Farming concept

We would like to find out how the mentioned equipment can contribute to Precision Farming, or more in detail:

- What are solutions to reduce e.g. overdosing and/or underdosing
- What is the technology needed for this
- How could an overall management system for preparation, seeding, fertilizing, dusting and harvesting look like in terms of planning, execution, monitoring and control (from a in the field and central management point of view)

Hint: please take into account that the farming is done in multiple steps. These may include e.g. preparation, seeding, fertilizing, dusting and harvesting. One step could maybe benefit from data collected in previous steps.



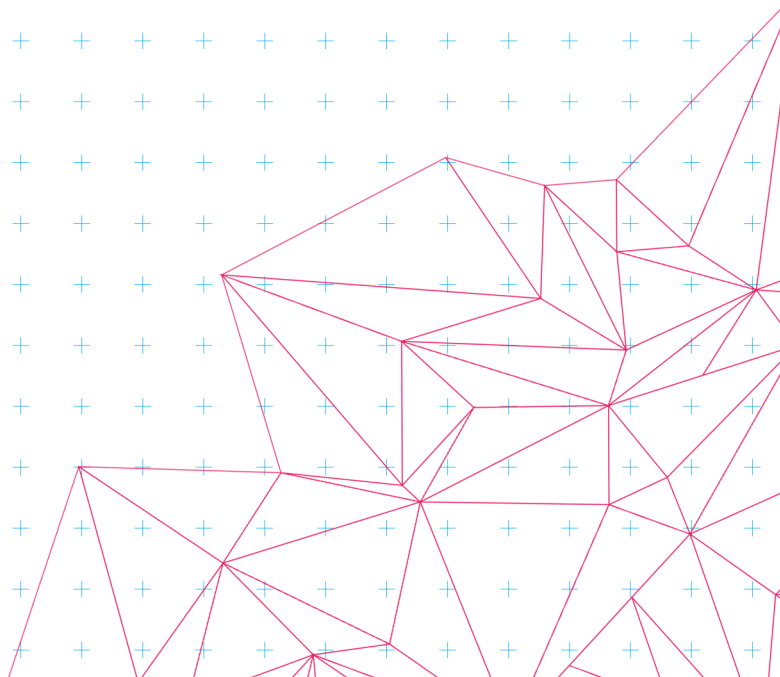
Input and involvement of challenge owner

We will challenge the project team on their solutions from a technical perspective as well as a business perspective by upfront discussions and reviewing afterwards.
Furthermore we have the commitment from one of our customers to also engage in this challenge and they will provide a demo in their experience center to clarify what the actual state-of-the-art is.

Resources

We offer to the students

- Expertise regarding electronic control systems
- Workplace (if and when needed)
- Support in market access (if and when needed)



Roles of different disciplines (only for ISBEP)

Automotive Technology	Working out mobility aspects of new farming technologies, and how they will be able to manoeuvre through a challenging environment
Biomedical Engineering	
Architecture, Urbanism and Building Sciences	Investigate the possibilities of farming in urban environments, potential indoor (multi-floor) solutions, and elements related to ventilation and irrigation.
Computer Science and Engineering	Develop software (and/or a digital twin) for controlling the farming technologies, having them communicate with each other in order to reach the most effective way of farming
Data Science	
Electrical Engineering	Working on the electronic (control) systems of the farming technology, and translate relevant aspects of the system into a model
Industrial Design	To come to a single solution consisting of multiple elements but looking and acting as 1
Medical Sciences and Technology	
Psychology and Technology	Farming will become different than it is today, which has a massive impact on future farmers. Taking their perspective into account in interfacing the new technologies is key.
Chemical Engineering and Chemistry	
Sustainable Innovation	To make this a future proof solution that balances between efficiency and the sustainable usage of resources, including the use of renewables, and life-cycle analyses of farming procedures
Industrial Engineering	Work out the logistics, value propositions and/or other related processes that are involved in developing new farming techniques
Applied Physics	Applying knowledge of image analysis and data-reduction to transfer images into information describing the condition of crops
Applied Mathematics	When farming becomes a multi-faceted technological process, new mathematical equations are needed that can help the human controller decide what to do when
Mechanical Engineering	Work on the mechanical design of the farming technologies, including their navigation, the handling of crops, their collaboration with other robots, and their sensors