# HiPer**Green** Newsletter

26th October 2018 | Sheelagh Bouvier

## HiPerGreen: Second half-year symposium

**S**tudents, researchers, professors and company representatives gathered to share progress and ideas at the second half-year symposium of HiPerGreen. This educational programme is a subsidised research project aiming to bring value to horticultural growers.

## Returning attendees

The HiPerGreen team was very pleased to see returning attendees: several guests were already present at the first symposium back in March 2018. Thanks to their interest in the team's work and progress, they helped fuel conversations especially with the newcomers. Among the new guests were students conducting research for HiPerGreen, company representatives and new HiPerGreen team members.

Following a welcoming lunch, Cock Heemskerk, head of the HiPerGreen project and lector in Robotica at InHolland University of Applied Sciences, invited the audience to take a seat in the amphitheatre where the symposium presentations were hold. After a few greetings and overall status updates regarding HiPerGreen's progress of the past six months, he gave the floor to Lucien Fesselet.

## Progress and achievements

Lucien, project manager at HiPerGreen, opened the symposium by giving a presentation. He talked about the minimal viable product (MVP) HiPerGreen is working on. For research and development purposes, the MVP is currently a rail system suspended to greenhouses heating pipes. Lucien briefly explained the timeline of this project and how the funds from SIA Take-Off HBO (€25 000) are being used. He went further on and explained that HiPerGreen is developing this MVP to make automated detection of fusarium in Phalaenopsis (a type of orchid) possible. The end product will be a greenhouse drone.

Once done with his presentation, Lucien invited several speakers working on the HiPerGreen project to come and speak to the audience. It was the first instance that representatives of partner companies gave a talk at the symposium to explain what they do for HiPerGreen and what their motives are.

HiPerGreen's first guest was Igno Breukers from DB2-Vision B.V.. This young startup created and manufactures a new type of multispectral camera for Precision Agriculture which is very suitable for use on a greenhouse monitoring drone. What makes it unique is that this high-end camera only possesses one lens instead of multiple ones. This makes it lighter and more affordable. After shortly introducing himself, his past expertise in this field and DB2-Vision to the public, Igno shared with the audience his strong enthusiasm regarding the upcoming partnership between his startup and HiPerGreen. In fact, it will be one of his company's first collaboration projects and application of their technology. The DB2-Vision team is eager to work with HiPerGreen in order to test and develop their cameras further, as they see greenhouse drones as a promising new market.

The following speaker was Tim Brander, head grower at Hazeu Orchids specialised in retail orchids. The greenhouse he works for collaborates with HiPerGreen and offers room for research and testing purposes. During his presentation, Tim explained two common struggles of all orchids grower: diseases scouting and the costly diseases' consequences. Explaining these problems was very valuable as the audience could better grasp the issues HiPerGreen is aiming to solve. HiPerGreen's final aim is to fly a drone in greenhouses in order to deliver a summary report and a map highlighting the greenhouse problematic areas. By supporting HiPerGreen, Hazeu Orchids aspires to improve their yields since they work in an extremely competitive market.

These scouting struggles were further explained by Tom Kearny-Mitchel, plant biology advisor at Applied Drone Innovations (ADI is the commercial branch of the HiPerGreen project). In his presentation, Tom tells of his work in segmentation and how drone-collected images can be analysed to detect illnesses in orchids. In a few sentences, he told the audience how he and Lucien are using two pieces of open-source software to distinguish fusarium from other orchid damages which are quite similar in appearance. Their work is crucial in developing HiPerGreen's MVP.

As HiPerGreen is an educational programme, an important amount of work is done by InHolland students. Lucien invited several students to summarise their team's work, findings and failures to the audience. The types of projects that student are conducting are very diverse. Their work allows the gathering of useful information, which guides HiPerGreen's progress in the right direction. The majority of the projects progressed healthily in the past months, which led to the completion of promising hardware and software prototypes and to new plans for experiments.

Among the student projects presented during the symposium were:
- The Green Junior's "Sensors and drones in horticulture" research project. This group of students will experiment on orchids in climate-controlled greenhouses at the InHolland Innovation Studio. By combining the images of two cameras (visible light and thermal energy) that are filming continuously, the students aim to spot diseases at their onset (the team will purposely make some orchid plants sick). Their final goal is to develop the best method to collect images for disease detection.
- Bart Röling's market research. Bart explained to the audience that through interviews and survey, he will assess orchid growers' current scouting costs and the savings greenhouse drone can bring.
- Mohit Lalwani's rail-based system. His prototype will soon be put into use. Thanks to his work, the HiPerGreen team will be able to test and improve its MVP and more specifically the cameras, sensors and systems that will equip the future greenhouse drones.

- Mark Ramaker's drone stabilisation software. Mark developed this piece of software based on block matching algorithms that he improved himself. His work was a much-awaited solution by the HiPerGreen team. Thanks to this computer programme, HiPerGreen will be apt to fly automated drones in greenhouses.
- Finally, Jeroen's Westerhout's drone landing dock station (see image) strongly attracted the audience's attention. This prototype is in fact a drone battery swap platform which will make automated drone's assignments possible in the future. Drones indeed need a new battery about every 20 minutes. Changing batteries manually is time-consuming and can cause small operational problems.



Throughout this event, the audience was engaged, and several presentations ended in the form of a panel discussion moderated by Lucien rather than a simple questions and answers session.

## Welcoming new ideas

At the end of the presentations, the HiPerGreen team invited the audience to a live drone demo in the World Horticulture Center main hall. For the first time at a HiPerGreen symposium, Lucien unveiled one of the team's newly-built technologies: live stream thermal images of plants. This live video acts as a scanning system and was shown to the public via a screen monitor. The images captured by a thermal camera on board the flying drone were instantly transmitted to a computer via a Wi-Fi connection.

Following this live demo, Cock invited the audience to brainstorm about three topics and to answer four questions. Guests wrote ideas on sticky notes that were later on discussed internally among HiPerGreen team members.

To summarize, guests advised HiPerGreen to keep its final goal in mind. In other words, they mean HiPerGreen should focus on the commercial idea of an automated greenhouse drone and not waste energy on other side projects. They warned HiPerGreen about the risks of miscommunications, which can easily happen in multidisciplinary teams, and of the lack of hard numbers. Finally, they pointed out the fact that data processing and automation should be the next projects HiPerGreen should work on.