2023-06790 - Probabilistic plant detection

Contract type: Internship
Level of qualifications required: Bachelor's degree or equivalent
Function: Internship Research

About the research centre or Inria department

The Centre Inria de l'Université Grenoble groups together almost 600 people in 22 research teams and 7 research support departments.

Staff is present on three campuses in Grenoble, in close collaboration with other research and higher education institutions (Université Grenoble Alpes, CNRS, CEA, INRAE, …), but also with key economic players in the area.

The Centre Inria de l'Université Grenoble Alpes is active in the fields of high-performance computing, verification and embedded systems, modeling of the environment at multiple levels, and data science and artificial intelligence. The center is a top-level scientific institute with an extensive network of international collaborations in Europe and the rest of the world.

Context

The agricultural industry is increasingly embracing digital technologies to enhance productivity, manage uncertainties, and adapt to evolving regulatory frameworks. One specific challenge faced by farmers is the need to reduce the use of biocidal products in their production methods. To address the issue of weeds, precision hoeing (mechanical weeding) presents a viable and easily implementable solution. This approach relies on simple equipment, the hoe, coupled to a tractor through a hydraulically shifted support controlled by a camera that detects crop rows.

Assignment

The objective of this internship is to develop a system for detecting crop rows during the advancement of the hoeing machine to generate commands for controlling the translation cylinder. In particular, we will develop a probabilistic approach to detect young plants by leveraging known a priori information, such as the distance between plants and rows. We will employ Bayes' theorem to refine estimates based on ongoing observations.

Main activities

To achieve this goal, you will: (1) familiarise yourself with the application domain, specifically inter-row mechanical weeding, (2) conduct a state-of-the-art review of possible approaches to this type of problem, (3) implement an algorithm for detecting young plants in both synthetic and real images.

If the results are positive, your algorithm may be tested on a farm located in Pontcharra.

Skills

- Currently pursuing a M1 or M2 degree in computer science, electrical engineering, robotics, or a related field.
- Good programming skills in Python, C++ or similar
- Familiarity with computer vision concepts.
- Solid understanding of mathematics, especially linear algebra and statistics.
- Strong problem-solving skills and the ability to work both independently and in a collaborative team environment.
- Excellent communication and presentation skills.

Benefits package

- Subsidized meals
- Partial reimbursement of public transport costs
- Leave: 7 weeks of annual leave + 10 extra days off due to RTT (statutory reduction in working hours) + possibility of exceptional leave (sick children, moving home, etc.)
- Professional equipment available (videoconferencing, loan of computer equipment, etc.)
- Social, cultural and sports events and activities
- Access to vocational training
- Social security coverage

Remuneration

Gratification = 4.05€ gross / hour
Applications must be submitted online via the Inria website. Processing of applications submitted via other channels is not guaranteed.

Defence Security:
This position is likely to be situated in a restricted area (ZRR), as defined in Decree No. 2011-1425 relating to the protection of national scientific and technical potential (PPST). Authorization to enter an area is granted by the director of the unit, following a favourable Ministerial decision, as defined in the decree of 3 July 2012 relating to the PPST. An unfavourable Ministerial decision in respect of a position situated in a ZRR would result in the cancellation of the appointment.

Recruitment Policy:
As part of its diversity policy, all Inria positions are accessible to people with disabilities.