sagentia innovation

Vision system using AI identifies objects in dusty agricultural environment

Expertise and domain knowledge

- Industrial
- Agri-tech
- Imaging systems – cameras, lenses and optics
- Machine learning / AI
- Software
- Agricultural product design
- Rapid prototyping
- Lab-based experimentation
- Modelling

Our client asked:

Our client wanted to determine the precise positioning and settings of a wide variety of agricultural implements, such as tillers, harrows, and sprayers, in order to provide alerts and notifications to the driver of the tractor. The client's aim is to optimise the agronomic performance of those implements and ensure that the driver is operating within safe limits.

Results: deliverables and outcomes

Our client received a robust prototype system that allows them to accurately determine the position and settings of the towed implement, whilst undertaking agricultural activities. We continue to develop this prototype into a mature product that offers significant benefits to farmers, in terms of enhanced safety and agronomic performance.

Contact us

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The project story:

- The natural environment presented challenges to conventional image analysis algorithms due to the variability in lighting from sunshine to night working, and the challenges of drifting dust affecting visibility.
- Sagentia Innovation assessed the performance of several vision systems, using a combination of experience, modelling and lab-based experimentation. We identified that low-cost, standard cameras in combination with active illuminated markers were the optimal solution for this specific challenge.
- We built a prototype vision system and conducted field trials using off-the-shelf cameras and lenses to collect images in the natural environment. Processing the data with conventional analysis routines produced variable results and often failed to find the objects of interest.
- A few hundred images, captured under various environmental conditions, were labelled by hand to mark up the objects they contained. This data set was used to train a convolutional neural network.
- The trained neural network was then used to successfully identify objects with high accuracy in subsequent images.
- Once the objects have been successfully located in each image, other automatic processes can be carried out on them. Two cameras can be used to get a stereo view, and the 3D position of the object can be accurately measured.