

## Automation and condition monitoring in precision agriculture

A recent article in the Financial Times highlighted the issues of stagnating yields and productivity from UK farms in relation to those from European neighbours such as Denmark, Germany and the Netherlands.

The article cites two main reasons that explain higher productivity levels in Europe compared to the UK. Firstly, it suggests there is a lack of government funding for research and development in agriculture across the UK as a whole. Secondly, it points to higher adoption rates of new technologies among European farmers compared to their UK counterparts.

Domestic agricultural research and development is accelerating, and more interestingly, adoption of technologies from other industries will soon begin to have significant impact.

Among the most important of these new technologies is automation. Automation has already been successfully deployed in industries where processes and conditions are both repeatable and predictable. Gradually, these automation systems are becoming more flexible and intelligent, removing the need for close human supervision. By increasing awareness of their situation through use of combinations of sensors and machine intelligence algorithms, automated systems are able to adapt in the face of changing environments to sustain an optimal outcome. For agriculture there are considerable benefits on the horizon in deployment of such systems, yet it remains one of the most challenging environments for them to operate within. Additionally, the investment to adapt



such systems for agricultural applications remains difficult to justify given the cost-restricted nature of the industry and – dare it be said – its resistance to change.

Thanks to initiatives such as Innovate UK, this picture should soon change. Domestic agricultural research and development is accelerating, and more interestingly, adoption of technologies from other industries will soon begin to have significant impact. Examples of such technologies include mobile robotic platforms and remote condition monitoring; these may be the catalyst for conversion from labour intensive human-controlled systems to low intervention human-monitored systems.

What can we expect to see over the next 10-20 years? Agriculture will shift from its drive to maximise single-operator throughput and economies of scale and instead we are likely to see growth in intra-field automated management systems for small cropping areas. Initially this may take the form of devices to perform in-situ crop, soil, pest and environmental monitoring for more accurate agronomy, and could then extend to performance of basic in-field operations. The current state-of-the-art in low cost sensor technology and over-the-air communication modules already make this possible.