



Dallan BYRNE

Institution: Ryan Institute, NUI Galway
Academic Mentor: Dr Martin Galvin
Commercial Partner: McHale Engineering Ltd
Commercial Mentor: John Warren

Dallan is a principal investigator working on agricultural machinery technologies with McHale Engineering. He has a strong record in developing industrial collaborations with universities. He received his PhD from NUI Galway in 2012 and has spent five years as a Senior Researcher at the University of Bristol.

Dallan's research focuses on developing, deploying and interpreting the significant data collected from farm machinery sensor technologies.

His work is documented in peer-reviewed journal papers on topics ranging from radar techniques; inverse problems in microwave healthcare; low-cost IOT sensor development for smart-home healthcare applications; Bayesian machine-learning methods for indoor localisation and behaviour context learning in an assisted-living environment.

See case study overleaf

Dr Martin Glavin

Dr Glavin has worked for over 19 years in collaboration with industry in digital signal processing for automotive and biomedical applications. He has published more than 70 peer-reviewed journal papers, four book chapters and more than 80 peer-reviewed conference papers. Dr Galvin is joint-director of the Connaught Automotive Research (CAR) Group at NUI Galway.

John Warren

John Warren is manager of the Electronic Research, Design and Development department at McHale Engineering's R&D facility in Ballinrobe, managing a team working on novel product design, and continuous re-design. He is responsible for the original design and ongoing development of the Fusion3 Plus, baler-wrapper – the world leader in its class. John has been the key contributor to the 42 patents on this machine.

Ryan Institute, NUI Galway

The Ryan Institute is NUI Galway's largest research institute comprised of 89 inter-disciplinary research groups and 12 Research Centres/Clusters drawn from colleges across NUI Galway. Its four thematic research areas are: Marine & Coastal, Energy & Climate Change, Agriculture & BioEconomy and Environment & Health.

McHale Engineering Ltd

McHale Engineering is the largest producer of agricultural machinery in Ireland bringing innovative, high-output, heavy-duty agricultural solutions to the market place. It researches, designs and tests specialist balers and bale wrappers in line with end-user requirements.

Dallan's project

GrassSense is a networked sensor solution for farm machinery deriving statistics at harvest time that will help predict the nutritional quality of foraged grass when the animals feed months later.

Effective foraging and storage of grass is fundamental to maintaining livestock throughout the winter months, particularly in Northern European grasslands.

Crop quality and yield estimation with sensing equipment is well-established for tillage applications, however, the technology is limited for grass harvesting applications due to the complex nature of the fermentation process. The farmer normally has little insight into the nutritional value of the harvested grass until the feeding season, several months later, when the silage clamp or bales are opened. This renders the estimation of feed costs impossible without the aid of additional analytics.

GrassSense will assess data aggregated from within the machinery and from the environment to predict the nutritional value of the harvested crop. Data analysis will highlight the benefits or drawbacks of the chosen harvesting times and techniques, storage environments and fertilisation methods. The filtered information will, for the first time, allow the farmer to analyse their forage practices in detail, while offering machinery vendors and manufacturers insight into the consumer needs and practices.
