

SNAPSHOT

AUTOMATIC OFFAL INSPECTION

Project Report Reference: 2016-1003

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Project Description

Offal inspection requires both internal and external activities. This project seeks to simplify this complex problem by using several sensors located in a multi-sensor tunnel. Each sensor obtains the "piece" of inspection information for which that sensor is most suited, the "pieces" are then merged to create a multi layered dataset from which an overall inspection decision and/or robotic sorting decision is extracted. X-ray images are used to inspect internally for cysts, lesions and pus and hyperspectral imagers and RGB cameras (with UV and white light sources) inspect offal surfaces for lesions, diseases, colour and contamination.

Project Content

Two streams of work progressed the development of automatic offal inspection.

- A Freedom to Operate (FTO) search was conducted
- Offal inspection algorithms used the spectral fingerprints of offal to identify offal tissue, and whether that tissue was "healthy" or "condemnable"

Project Outcome

The FTO search suggests that AMPC has the freedom to develop and use hyperspectral imaging, DXA imaging and RGB-UV imaging sensors in a multi-sensor tunnel for the purpose of offal inspection.

The inspection algorithms identified 92% of offal correctly and were able to correctly "condemn" offal with cirrhosis, facial eczema, abscesses, c. ovis, kidney necrosis and lung diseases, however pleurisy and peritonitis require further algorithm development.

Benefit for Industry

Grading currently requires a highly trained person who must concentrate for long periods while making rapid time-bound decisions relating to food safety and overall carcase value. Thus there are high labour costs and business risks associated with human graders.

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This project progressed the development of a robust automatic grading station to deliver objective results in real-time while maintaining auditable data files. A commercial unit would:

- have minimum performance criteria meeting AQIS standards for human graders (reducing compliance and training costs)
- deliver a consistent standard of objective offal assessment across multiple sites
- replace human graders (reducing labour costs);
- operate with minimal additional product handling and damage
- never be tired or lose concentration (reducing business risk)
- automatically upload inspection results to plant IT systems (reducing data handling errors)
- maintain auditable data files on FIFO basis (reducing compliance risks and costs while enhancing customer's business risk)
- provide spatial data to enable future robotic manipulation of the offal for sorting and packaging. (productivity gains)
- demonstrate technologies that can be migrated to carcasses applications (leveraging project investments)

USEFUL RESOURCES

- Information about the ELECTROMAGNETIC SPECTRUM (X-rays, ultraviolet, visible, NIR, terahertz and microwaves) can be found here
https://en.wikipedia.org/wiki/Electromagnetic_spectrum
<https://en.wikipedia.org/wiki/Spectrum>
- Information on AgResearch and its Food Research can be found here
<https://www.agresearch.co.nz/our-science/food-and-bio-based-products/>
- Information on working with AgResearch can be found here
<https://www.agresearch.co.nz/doing-business/working-for-you/>