Intelligent solutions for boxed beef trim export enhancement

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Project Report Reference:
2017-1006

Project Description

Mislabelling of "beef in box" products, lack of packaging integrity checks and absence of archived and traceable visual data for the exported products incur significant costs to Australian beef exporters. This project aims to study technologies that can remedy these issues and improve the situation by using intelligent automation technologies and solutions.

The project scope includes analysis of the parameters that contribute to improving the export process, as well as reducing errors via utilisation of machine vision-based solutions. The emphasis has been on using technologies already available to AMPC. A prototype of the bench scale automated labelling system was designed and developed as a proof of concept and demonstration of the technology. Cost benefit of using smart automation and feasibility of implementing the technology in a total solution framework was also presented.

Project Content

The increasing international demand for Australian beef products has led to significant growth of the meat processing industry sector. Consequently, there has been a dramatic increase in speed of operations in meat processing plants, including the grading of the processed meat products. Manual classification and grading of beef products are subjective, inconsistent, inaccurate, and slow. Indeed, classification of beef cuts and products, and quality data documentations are intrinsically complicated and error-prone tasks mainly due to wide variations in beef cattle genetics. To address these challenges, smart automation of the processes was considered as an alternative process for fast, objective, consistent, and accurate beef grading and labelling of the beef cuts.

Project Outcome

An extensive review of market requirements for important export markets, with the intent of identifying the common requirements, was conducted. Some of the best possible combinations of technologies for rectification of mislabelling problems, with the emphasis founded upon finding pathways for commercialisation of the AMPC-owned technologies, were identified. During this project, appropriate measures were suggested to quantify the success of the labelling issue so that a plant performance can be both measured and benchmarked. These measures were also compared with the industries best practices to ensure that the proposed solution meets the overall industry requirements. Two testbeds (conceptual and detailed prototype) have been designed, constructed and tested. Figure 1 shows the prototype of the above system.

Zoom view of P20 Pro screen:

Conveyor Controller

Detected type: Rump

Stop

Select Classification

Correct Classification	
Cube Roll	Chuck Roll
Rump	Shin Beef
Tenderloin	Striploin

User interface menu: detected cut, a classification screen to finalize the label

Micro switch to detect the box and control the conveyor

FESTO MPS500 conveyor belt loop

Figure 1. Prototype testbed in operational configuration

Figure 2 shows representation of a sample "beef in box" package by the top view image of a box. The image is reflected to the HUAWEI P20 pro mobile system using a side mirror positioned properly with respect to the box, conveyor and the mobile. The image attached to the conveyor is stopped after it is sensed by a proximity sensor until the cut is identified by the system. The user interface graphic software in the mobile identifies the cut and suggests it to the operator for confirmation/correction.
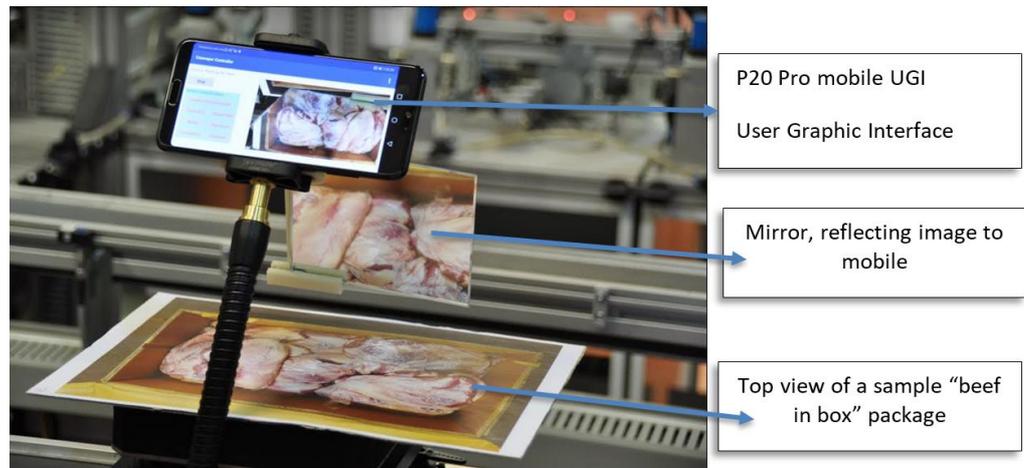
Figure 2. A closeup view of, the conveyor loop with HUAWEI P20 pro system, mirror, holder, image of a beef in box.

Benefit for Industry

The proposed technology has the potential to accelerate the slaughter house operations whilst preventing mislabelling issue. This approach connects the packaging and labelling operations, hence acting as an enabler for integrity checks, visual data archive generation as well as improving overall export documentation. These as aforementioned not only increase the smoothness in flow of the meat packaging processes, but also reduce work-in-progress and waste and simultaneously rework, which would prevent significant costs for the industry. It also has the potential to ensure consistent labelling and hence less trouble in maintaining the international market share for the entire industry.

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