Snapshot Report

Collaborative Robots

Collaborative Robots Evaluation and Deployment Strategy Development – Stage 2

Project Code
2021-1243

Prepared by
TME Systems Pty Ltd

Date Submitted
28/10/2022

Project Description

With this Stage 2 of the Collaborative Robot Evaluation and Deployment Project the aim is to encourage, via reducing the risk, for collaborative robot manufacturers, integrators and the Australian red meat processing sector to ascertain:

1.1 An understanding as to where collaborative robots could be deployed today within a meat processing business.

1.2 An understanding as to where collaborative robots may be utilised in the future in the industry, and what is preventing this from occurring today. For example payload, washdown, speed, end-effectors, guarding, process changes. Outcomes from this step will feed into Stage 5.

1.3 Engagement with possible meat processing customers who by seeing the potential of the deployment of collaborative robots will engage with AMPC and providers/integrators to then deploy demonstration solutions at a range of Australian red meat processing facilities against the range of identified 'today' opportunities.

1.4 Development and submission of Stage 3 deployment projects for funding consideration by AMPC

Stage 2 was a great success. We established several use cases as further outlined later in this report.

The perfect use case and location to fit into this Stage for onsite trials was the Primal Identification and Packing using 3D and 2D Vision in combination with AI technology and a Collaborative Robot. The Robot can work right next Human Workers performing the same task and it reduces the workload on the Humans when there are not enough Human Resources available.

The Equipment required to complete the task was:

- Universal Robot UR10e
- Intel Real Sense 3D and 2 D Camera
- Vision PC for processing our Vision Code
- A Suitable Gripper to pick the selected Primals off the Conveyor

Our work process consisted of:

- Software Development in our workshop which included
    - Identifying the selected Primals with the Vision System
    - Getting the Co-ordinates of the Primal on the Conveyor including direction
    - Tracking the Primal along the Conveyor
    - Getting the Robot to pick the Primal off the Conveyor while it is moving
- Finding a suitable Gripper
- Onsite visit to collect Sample Data and measure the area for the Trial
- Build the Onsite framework for the Robot and Camera
- Complete the Onsite Trials

The Software we developed identifies the Primal by size, shape and volume using the 3D Image as well as AI Vision Technology using the 2D Colour Image. Combined with the Robots ability to track the Conveyor movement we are able to send the co-ordinates of the Primal to the Robot at the time the Images was taken and the Robot will track it from there, it will pick it up when it is within reach and the place into a shipper carton.

The Current Software has limited Primal Samples programmed into it and for a permanent installation further Samples are required for the AI to me more robust across a wider range of Primals.

After the initial software development and building the framework for the Robot and Camera in our Workshop, we conducted the Onsite Trial at JBS Scone. We received great feedback from JBS and immediate interest for a permanent installation at that site.

Further positive feedback was received from our Demo System at the AMPC Innovation Showcase this year and we anticipate more installation inquiries once the first system is installed.

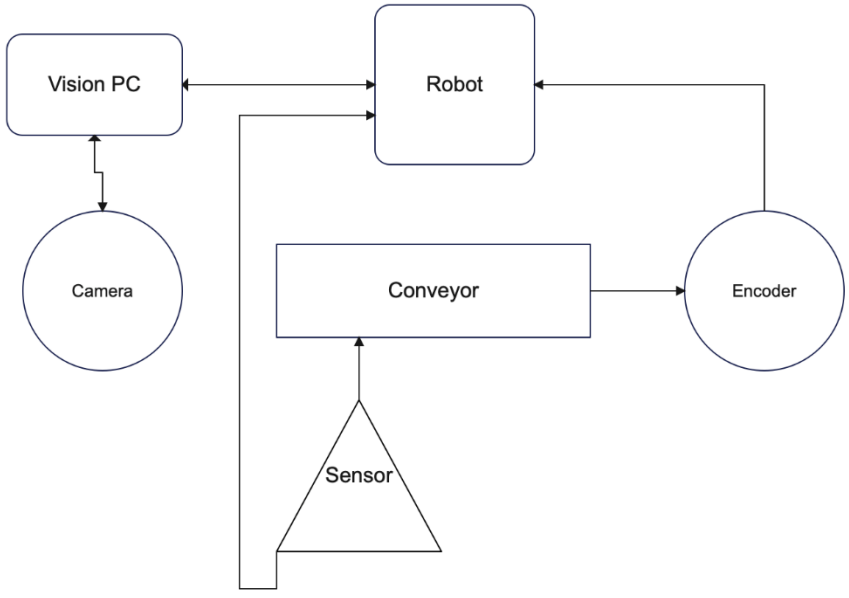
Project Content

In this Project we conducted Site Visits to identify various Collaborative Robot Opportunities.

Once the most suitable Opportunity for this Project was identified as the Primal Identification and Packing using a Collaborative Robot the Vision and Robot Software was developed, a Trial System was built and the Trial was conducted at JBS Scone.

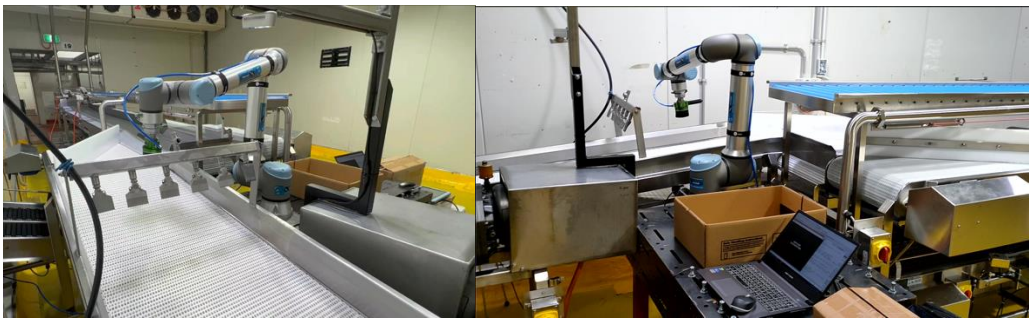
Project Outcome

The Primal Identification System consists of the following elements.



- The Sensor detects the Primal on the Conveyor and sends the signal to the Robot.
- The Robot requests the type and location of the Vision PC and starts tracking the primal with the Encoder.
- The Vision PC uses the Camera to capture and 3D and 2D image.
- The Vision PC analyses the data and send the Information to the Robot.
- This information could be to let the Primal pass or to pick it and pack it.

The Trial Collaborative Robot installation fit into a tight space and required some fancy Robot moves to complete, a more suitable location and Robot mounting is recommended for a permanent installation.



A Video of the Trial can be viewed at this link: https://youtu.be/RQHsjKRi2Xg

Benefit for Industry

The Primal Identification and Packing System has a number of benefits for the industry.

- Labour Saving
  - Because the Industry is struggling to find enough Labour Resources this system can work alongside of Human Resources to fill the shortfall of Human Resources.
- Less Injuries
  - Picking Primals off a Conveyor while standing on your feet all day is hard work. Every Robot in this application will prevent a possible injury to a Human Resource.
- Better Productivity
  - Robots don't need Meal Breaks, go to the Toilet or take Holidays, they will work continuously 24/7.

Useful resources

https://tme.systems/
https://youtu.be/RQHsjKRi2Xg