SNAPSHOT

DEMONSTRATING & TRIALLING OF AN INTERNET OF THINGS SOLUTION FOR REAL-TIME COMPUTATION AND DELIVERY OF PLANT KPIS

Project Report Reference: 2017-1003 **Date: 10 May 2018**

Project Description

This project considered opportunities for introducing Industrial Internet of Things (IIoT) solutions to the Australian red meat processing industry aiming to improving meat processing worker and plant productivity. Based on the outcomes of an industry consultation that was conducted in this project, the project developed an IIoT wearable technology system for achieving the following in real-time: (1) identifying workers regardless of location (e.g. at different workstations and/or moving around a plant), (2) recognition of different worker activities (i.e., productive, blade alignment and idle) with correlations to knife sharpness, and (3) pathway to monitor and optimize throughput per worker per hour KPIs. A trial of the IIoT system was conducted in a meat processing plant and demonstrated its effectiveness in assessing and improving in-plant productivity.

Project Content

- Designed and built an IIoT system that computes and visualizes fine-grained in-plant KPIs in real-time. Trialed this IIoT system in the plant of an industry partner for a period of two days (4 shifts) and demonstrated its value in assessing and improving plant productivity with no negative impact on the plant operations or the production shifts involved.

- The IIoT system utilized acceleration and pitch sensors integrated in wearable IIoT devices (as depicted in Figure 1) to produce quantitative data in real-time that clearly indicated that less experienced workers devote significantly more effort and time during the boning operation than experienced workers (in some cases almost 50% more). Figure 2 shows sample productivity data for experience and inexperience workers collected during the IoT system trial at the meat processing plant. This IIoT system and IIoT technology in general provide a pathway for novel approaches to train workers and improve throughput per FTE per time unit. The project also conducted a cost-benefit analysis to illustrate the cost-effectiveness of this IIoT system.

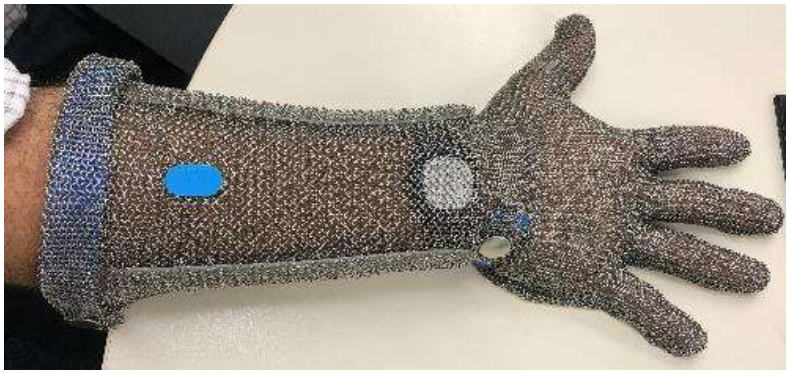

Figure 1: IIoT Meta sensor (Watch Device) worn under protective mesh glove.

Project Outcome

- An IIoT system (combining a variety of sensors integrated in a wearable IIoT device, wireless sensor gateways, low power and Wi-Fi networks, and cloud-based data analysis software) for computing worker identities and KPIs that are critical in assessing and improving meat processing worker and plant productivity.
- Documentation and video evidence of the trial and the resulting operational effectiveness of this IIoT system in-plant.
- Iindications from a cost-benefit analysis of payback in as little as 0.4 years (which can be reduced further where plants have suitable IT infrastructure in place that can be utilized).
- No negative impact on the plant operations, worker safety, or loss of productivity.
- Proof that this and other IIoT solutions can lead to novel approaches for significantly improving plant productivity.

	Worker 1 (Experienced)	Worker 2 (Inexperienced)
Idle Time	36%	8%
Productive Time	63%	91%
Alignment Time	1%	1%
Active States	49	30

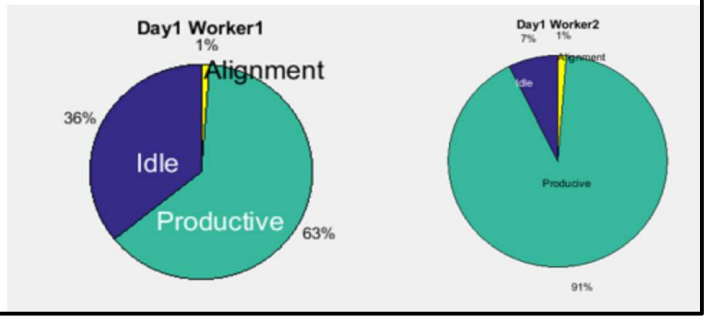

Figure 2: Sample output from IIoT in-plant trial showing that an experienced worker takes 31% less time (i.e. has less "Productive" time) whilst completing 63% more throughput (i.e. as indicated by the number of "Active States").

Benefit for Industry

- Improved efficiency and profitability of the Australian red meat industry.
- Increased plant throughput per FTE per time unit.
- Real-time in-plant efficiency data (e.g., enabling immediate determine if sections of the workforce are unutilized or under-utilized).
- Platform for more effective, automated and efficient worker training.
- Improved floor supervisor effectiveness

USEFUL RESOURCES

2017-1003 Final Report
MINTRAC Presentation Slides
Video capture of the trial