Bulk Carrier Vessel Tracking Automation – The Dalrymple Bay Use Case

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ABSTRACT

Recent advances in ruggedized industrial control system technology and architecture in combination with latest technologies in the fast evolving 3D LIDAR sensor sector becoming available have enabled the implementation of sophisticated automation algorithms for mining equipment such as bucket wheel reclaimers, as published by the authors in the peer reviewed AusIMM 2019 Iron Ore conference proceedings. This paper provides an overview of a second use case for such automation technology in bulk material ports integral to iron ore operations.

The real-time 3D machine vision-based port automation system described in this paper was originally developed in 2018-19 for the BHP-Mitsubishi Alliance's (BMA) Hay Point port. The system has seen deployment at other major mining and general ports in Australia, including at Dalrymple Bay Infrastructure (DBI), Hay Point, Queensland. It has the following use cases:

- Docking Aid
- Port traffic control on site and at remote operations centres
- Vessel loading safety control for traditional bulk carriers and for iron ore trans-shipment from other vessels as already occurring for existing and proposed for several emerging West Australian iron ore shipping operations
- Vessel breaking mooring safeguard
- Port / berth infrastructure safeguard

In order to deliver the above functionality, the system automatically tracks in real-time and records in a historical data base not only vessel approach and departure data, but importantly all six degrees of freedom (6 DOF) vessel motions surge, sway, heave, roll, pitch and yaw for all attending vessels during their mooring cycle.

This paper details the specific use case of the system at DBI's continuous wharf featuring 4 berths. It also details the potential for using it as the basis for increasing berth access for required tasks during a vessel mooring cycle, considering such access is traditionally categorically denied because of the potentially fatal risk of mooring line snap back.