

Container tracking via AIS satellites

Authors: Timo Bretschneider, Nguyen Thai Dung

Proposed presenter: Timo Bretschneider

Affiliation: Airbus Group

Mailing address: 110 Seletar Aerospace View, Singapore 797562, Republic of Singapore

Phone: : +65 - 6592 7300

Fax: +65 - 6659 1276

E-mail of corresponding author: timo.bretschneider@eads.net

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Current systems for global container tracking use GPS to determine a container's geographical position and a satellite modem for communicating this information to a central server. However, the communication results in significant operational costs and both services require a large degree of line-of-sight between the container and the corresponding satellites. In particular the latter requirement is difficult to fulfil once containers are stacked.

This paper describes an alternative approach based on the automatic identification system (AIS), which in recent years experienced a global boom after several companies launched satellites that can sense the signal remotely from space. Originally derived for the exchange of voyage details among ships in order to reduce the risk of collisions, the described system extends AIS twofold. Firstly, the surrounding transceivers' transmitted AIS information is used together by additional information provided by a vibration sensor and semantic reasoning to compute a container's position, thus, forgoing the usage of a GPS receiver. Secondly, embedded features in AIS are used to transmit the container's position transparently avoiding interference with the original use case. Global coverage is enabled through the availability of numerous AIS dedicated remote sensing satellites as well as auxiliary AIS payloads onboard of communication satellites.

Simulations results and measurements are presented to demonstrate the capability of determining a geographical position for a container in a GPS-denied environment. A strong focus is placed on the spaceborne sensing, which is crucial for global 24/7 availability of the tracking information.