VESSELTRAX SHORE-SIDE MARITIME APPLICATIONS

JOHN ASTAD DESCRIBES HIS AUTOMATIC VESSEL IDENTIFICATION SYSTEM THAT REPORTS VESSEL POSITIONS USING GOOGLE MAPS

Geospatial data is being successfully utilized in a variety of ways across a wide spectrum of global disciplines. In the maritime sector GPS is used extensively in the safe navigation of marine vessels for collision avoidance in our ports, harbors, and waterways. Current maritime regulations originating from the International Maritime Organization, a United Nations maritime organization, require shipping traffic to relay dynamic course, speed, and position data to other commercial traffic in the area to assist in the safe and prudent navigation of vessels. This is accomplished by integrating an Automatic Identification System (AIS) transponder that couples the geospatial data from the GPS which then relayed to other vessels via the standard marine VHF frequencies.

Additionally, on a global basis local state port control authorities such as the United States Coast Guard in the USA have implemented area vessel traffic control systems where the dynamic and static data is relayed to a central control facility. The vessel traffic control system is analogous to the air traffic control tower at you local metropolitan airport where traffic controllers maintain a constant real time situational awareness of the airspace domain.

In this article I'll be discussing the maritime domain and how vessel tracking utilizing AIS technology can assist maritime

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administrators efficiently allocate resources in conjunction with ship or barge arrivals. Specifically, the maritime manager may ask what software and hardware is needed to track vessels from a shore side point of view in contrast to the navigational requirements that professional mariners use in collision avoidance.

AIS Shore Side Applications

Toward the end of last year, an idea came to mind working as a Loading Master/Dock Operator at the marine terminal in the Port of Texas City, where for over the past four years I have conducted marine cargo transfer operations of refined petroleum products between the marine terminal, barges, and tanker ships. For instance, it became apparent after many vessel arrivals that vessel tracking utilizing automatic identification system technology would be very useful as cost efficient tool in shore side applications.

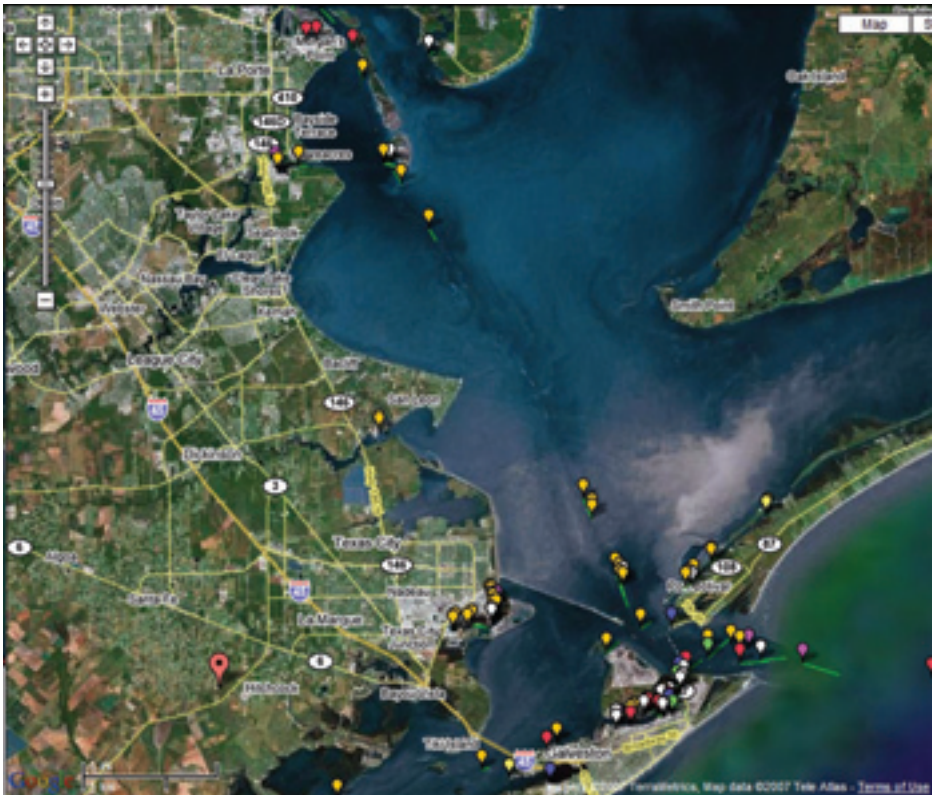
For example, at times the current information from port agents or other third parties fails to specifically provide accurate information on vessel arrivals. This can be very costly where thousands of dollars in demurrage fees can ensue with lost time. I've noticed embarrassing situations where a tanker ship or barge arrives at the dock and no one at the terminal is aware of the vessel arrival except the harbor master and line handlers. With real-time information regarding inbound vessel traffic scheduled for arrival, personnel and resources can efficiently be allocated accordingly in conjunction with an accurate vessel arrival times captured from a shore installation of an AIS receiver.

Terrestrial Solution

A shore side installation of an automatic identification system that utilizes geospatial data is very economical (147.00 €) as there is no need for a costly transponder (740—3700 €) as required on commercial marine vessels for collision avoidance. Instead only an AIS VHF receiver is required in obtaining vessel position data. Additional hardware includes a marine VHF antenna whip, low loss coaxial cable connected to the backside of the AIS receiver, and finally on the front side of the AIS receiver, a USB/serial adapter which is plugged into the USB port on the PC. Furthermore**,** in order for the serial binary data of 1's and 0's to be interpreted on the computer, commercial charting software such as Shipplotter or SeaClear II is utilized in obtaining a seamless graphical user interface for the maritime manager in the office environment.

Vessel Positions on the Web

A further enhancement of the automatic vessel identification system in shore side applications is viewing vessel informational data on the World Wide Web. VesselTrax and other maritime data providers offer this



service either for free or on subscription. VesselTrax accomplishes this using Google Maps or Google Earth. Behind the scenes, the serial data from the AIS receiver is run with a VBscript of the Shipplotter software, then converted to a data.xml file which is uploaded to the web page on a web server with the Windows Task Scheduler or other suitable time-based cron utility. The final product is the vessel position data on Google Map or Google Earth where the viewer can easily locate the vessels of interest and schedule resources and assets according to the future vessel arrivals. This is the ideal solution for maritime administrator, as no hardware or software is required, only an internet connection and a web address to a maritime data service provider.

The Google Connection

Google Maps have a wide range of possibilities where anyone who has surfed the web trying to find a geographical location or map directions has had some experience with. Instead of finding terrestrial information on the Google Map, users on VesselTrax can view vessel data on the adjacent bodies of water. What's really neat about Google Maps is the java script that can be easily copied and pasted from the Google API web site to your own web site with your favorite html editor for any creative application that you have in mind. No special intensive training is required, only the desire to get your content out on the web for others to view.

AIS Limitations

VHF signals are line of sight and the maximum distance that vessels can be located with an AIS receiver is approximately 15-25 miles (24-40 kilometers). At times during extreme atmospheric conditions, tropospheric ducting can occur and VHF signals will bounce off the atmosphere and travel hundreds of miles. During these exciting times of physical phenomena, VesselTrax provides data of the supertankers lightering crude oil over 60 miles offshore from Galveston, Texas in the Gulf of Mexico. An excellent resource concerning trophospheric ducting on a global basis is William Hepburn's website on worldwide trophospheric ducting forecasts.

Overcoming Limitations of AIS

High tech meets low tech where my tree climbing skills of the past while came in handy several months ago when VesselTrax extended its range. For example, the 9 meter high tree adjacent to my house provided the ideal radio tower and quite a bit of amusement for the neighbors and my tabby wildcat Skeeter. After the antenna was secured in the tree with electrical ties and 15 meters of low-loss coaxial cable connected it to the AIS receiver, the range of AIS signals nearly doubled. Of course, I wouldn't recommend this to everyone, but it did overcome range limitations in a very economical manner. The higher the antenna the better the reception and collection of vessel position data.

Another solution in overcoming range limitations is installing additional AIS receivers in remote locations strategically along the coastline where the vessel position data can be sent over the internet using TCP/IP protocol with a serial server connected between the AIS receiver and router and sent to a central location over the web. AISLive, a company owned by Lloyds-Fairplay and BV QPS of the Netherlands utilizes this method in its excellent global network for an annual subscription fee.

Future Needs

AIS data is composed of static and dynamic information. The dynamic data consists of vessel position, course, and speed utilizing GPS onboard the vessel. In contrast, the static information comprises the vessel name, radio call sign, IMO number, class of vessel, estimated time of arrival, and destination. This static information is entered by the navigational officer or master of the ship.

The majority of vessel traffic in the Houston-Galveston-Texas City area is barge traffic transporting refined petroleum products. At times the towboat pushing the barges may switch with another towboat. This presents a problem for the maritime manager at the marine terminal when viewing the AIS vessel position data, especially when management is not notified of the vessel switch.

A desired solution would be to also incorporate the barge identification numbers amongst the static AIS data so that shore-side personnel can accurately determine arrival times of the barges. Hopefully, in the future the towboat and barge industry on the inland waterways will acknowledge this disconnect in the communication link with the marine terminal interface. Of course, AIS as a navigational collision avoidance system was never meant to make shore side operations more efficient. It's only through feedback with office maritime management will an industry standard utilizing geospatial data be achieved.

Conclusion

There are many components in the utilization of the automatic identification system for vessel tracking in shore side applications. Basically VesselTrax used hardware and software that was originally designed for marine applications and applied them in a manner that would be beneficial to maritime managers at the marine terminal. Geospatial data has come full circle from terrestrial to now marine applications.

Helpful Links

VesselTrax - http://www.vesseltrax.com
ShipPlotter - http://www.coaa.co.uk/shipplotter.htm
AIS Overview - http://www.navcen.uscg.gov/enav/ais/

John Astad *is the founder of VesselTrax. He has been working in the marine transportation industry for 10 years, marine terminal operations for 5 years, and currently works as a Loading Master at the Port of Texas City. He can be contacted at john@vesseltrax.com.*