**Introduction**

The current method for measuring ship draft is where a small group of people are sent out on a small boat and have to manually read the markings on the side of the ship, and calculate draft from the markings. A safer and accurate method for measuring ship draft that is still under research is the use of a laser rangefinder that can calculate the distant from the deck of the ship to the surface of the water [1]. There is also an underwater range finder that could be attached to the bottom of the ship and map out the underwater terrain [2]. Either of these new rangefinders would be safer than and just as effective as the current method of using manpower. For implementation on to ships a more powerful laser would have to be developed that could accurately measure from a greater distance, and it would have to take into account waves and travel through rough waters [3]. A level sensor could be used to help with taking into account instability of the ship due to non-ideal traveling conditions [4].

It is currently unknown which type of laser rangefinder will be most successful, how exactly will effectiveness be measured in terms of calculating draft, how many rangefinders will be needed on the ship, and where will the best locations be on the ship to mount the system? The laser will have to have a software program that is either integrated into the software already on the ship, or have its own independent program that displays in the control room of the ship, possibly like a scanning simulator [5]. Therefore, the purpose of this project was to research the use of laser rangefinders on measuring ship draft, and design and build a prototype that will be tested and later implemented on the construction of naval aircraft carriers for temporary use or permanent use.

References

1. Liu, M , Shandong Provincial Key Lab. of Ocean Environ. Monitoring Technol., Inst. of Oceanogr. Instrum., Qingdao, China, Gai, Z , Zhao, J , Cui, X , Yang, L , Chu, S , Yang, J , *Development of Laser Water Level Measuring System Without Cooperative Target* , *May 21-23 2012,* Photonics and Optoelectronics (SOPO) , vol , no , p.1 – 3
2. Cain, C , Lenonessa, A , “Laser Based Rangefinder for Underwater Applications,” in *2012 American Control Conference, June 27-29 2012, Canada.*
3. Kim, Y , *A Numerical Study on Sloshing Flows Coupled with Ship Motion-The Anti-Rolling Tank Problem* , Journal of Ship Research , vol 46 , no 1, p.52 – 62
4. Zheng, H , Huang, Y , Ye, Y , *New Level Sensor System for Ship Stability Analysis and Monitor* , IEEE Transactions on Instrumentation and Measurement , vol 48 , no 6, p.1014 – 1017
5. Ohtani, K , Yamamoto, S , “An Advanced Laser Rangefinder Equipped with a Scanning Simulator,” in *Proceedings of SICE Annual Conference 2010, August 18-21, 2010, Taipei, Taiwan.*