The purpose of this new research is to create an experimental system that is capable of measuring the draft of a large ship using a laser measuring method. The system will have increased functionality and be able to function in a variety of weather and lighting conditions.

Modern technology has made it possible for the draft of a ship to be measured quickly and with greater accuracy than traditional methods [1-4]. Several digital draft measuring techniques have been tested in the past decade whose component systems range greatly and include the use of cameras, pressure sensor, fiber optics, laser range finders, echo-sounding, electro conductive paint, and local satellite communication [1-3, 5-8]. The research conducted on these systems has provided a good base line of possibilities, experimentally proving that the accuracy of some of these methods is within several centimeters of the true draft line, however, few systems have been tested or integrated on the full scale [1,2,5,7].

The method utilizing laser range finding technology has been tested to show an accuracy of ±1.5cm, but has a useful distance limit of 12m, meaning further development of the system would be required to extend this range for use on a large scale ship[1]. The usefulness of this system would also require more testing to determine if there are any limiting factors such as weather conditions, or the effects that reflecting the beam off of water would have on the overall accuracy. Several factors relating to the mounting of the laser sensor are still unknown including the effects of vibration, and at what mounting angle relative to the reflective surface will result in the most accurate reading. The research on this topic has shown that the system can produce a less accurate reading of ±3cm in “sloshing” water, but further testing has not been conducted on larger waves as would be seen at sea [1].

The focus of the current research is to expand the knowledge and understanding of the laser range finding technique to measure the draft of a ship. Planned study of this topic focuses on the gaps that have been left by previous research and aims to conduct experimentation on the laser sensor system to determine its performance and longevity in adverse conditions of weather, lighting, and angle relative to surface to determine its usefulness on a large ship.

[1] Z. G. Mengde Liu, Jie Zhao, Xiao Cui, Li Yang, Shibo Chu, Junxian Yang, "Development of Laser Water Level Measuring System Without Cooperative Target " 2012.

[2] I. J. R. Ivce, R. Mohovic, "Determining weight of Cargo onboard ship by means of optical fibre technology draft reading," *Promet-Traffic-Traffico,* vol. 23, p. 8, 2011.

[3] C. S. Xin Ran, Jinbiao Chen, Shijun Ying, Keping Guan "Draft Line Detection Based on Image Processing for Ship Draft Survey " in *International congress CACS* 2011, p. 6.

[4] "Standard Practice for Draft Measrement of Surface Water," *ASTM International* vol. 5073, 2013.

[5] H. Y. Z. Huayao, Y. Yinzhong, "New level sensor system for ship stability analysis and monitor," *IEEE Transactions on Insturmentation and Measurement* vol. 48, p. 3, 1999.

[6] K. H. Y. Jkemoto, M. Makino, R. Fukasawa, H. Goto, T. Hamada, "Development and evaluation of a new measurement system for ship hull-side wave profiles using electo-conductive paint," *Oceans,* p. 6, 2012.

[7] T. G. G. Giorgi, P. Teunissen, L. Huisman, K. Klaka, "Carrier Phase Ambiguity Resolution for Ship Attitude Determination and Dynamic Draught," *Positioning Techniques for Hydrography,* vol. 31, 2010.

[8] X. a. G. Chuanren, Wang, "Intelligent Draft Guage for Ships ", 2013.