

# Concept Design of a Long Range AUV Propulsion System with an Onboard Electrical Generator

by

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## **ABSTRACT**

Automated Underwater Vehicle (AUV) Technology has come a long way in the past decade. Due to advances in batteries and telecommunications, unmanned underwater vehicles no longer require a tether to a mother ship for power, command and control. AUV endurance and range, however, are still limited by the size and capacity of the onboard batteries. Attempts to overcome this limitation, with studies utilizing fuel and solar cells were developed to augment the stored energy onboard. This thesis examines the viability of utilizing an internal combustion engine as an onboard generator to recharge the batteries in during the mission in order to increase both range and endurance. Working in conjunction with the MIT Rapid Development Group, an onboard generating system was developed utilizing a gasoline generator. This system was incorporated into in a clean sheet propulsion system design of a long range AUV propulsion system. Maximum efficiency of all components was stressed at every point in the design process in order to decrease the propulsion system power requirements. Advanced lithium-ion battery systems were also investigated in order to find a system that balanced maximal energy storage with low recharge time. The study resulted in a theoretical AUV propulsion system that could traverse distances that span the Atlantic Ocean at a speed of 2 kts. It is believed that this type of AUV would be ideal for both scientific research and military applications.

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