

# Improving Shipboard Applications of Non-Intrusive Load Monitoring

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The Non-Intrusive Load Monitor (NILM) measures equipment performance by measuring and analyzing the source power to the equipment at a single point in the electrical system. Previous studies have proven the usefulness of the NILM system in characterizing the state of mechanical systems onboard U.S. Coast Guard vessels and at the U.S. Navy's Land Based Engineering Site (LBES) in Philadelphia, Pennsylvania.

This thesis seeks to improve the NILM system by exploring a more user friendly Graphical User Interface (GUI) to allow shipboard crews to utilize the NILM while in operation. Previous applications of NILM required post-event data analysis in the laboratory. An additional NILM was installed on the Low Pressure Air Compressor (LPAC) #1 at the LBES facility to investigate abnormalities detected in the operation of LPAC #2 by previous research. The ability of the NILM to function at the highest levels of the electrical distribution system was also explored at the LBES facility with the installation of two additional NILM systems on the main switchboards supplying power to the auxiliary system loads. Finally, a brief overview of the analysis software of the Multi-Function Monitor (MFM), a key component in modern ship's Zonal Electrical Distribution Systems (ZEDS), is presented to explore the possibility of the NILM and MFM systems operating in conjunction to improve the operation of future ZEDS.