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## **APPLYING NEW METHODS IN RAPID PROTOTYPING TO ADVANCE LOW-COST DEEP-SEA EXPLORATION**

Nicholas P. Chaloux  
*University of Rhode Island, chalouxn@gmail.com*

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APPLYING NEW METHODS IN RAPID PROTOTYPING  
TO ADVANCE LOW-COST DEEP-SEA EXPLORATION

BY

NICHOLAS P. CHALOUX

A DISSERTATION SUBMITTED IN PARTIAL FULFILLMENT OF THE

REQUIREMENTS FOR THE DEGREE OF

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IN

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MASTER OF SCIENCE IN  
OCEAN ENGINEERING THESIS  
OF  
NICHOLAS P. CHALOUX

APPROVED:

Thesis Committee:

Major Professor      Brennan T. Phillips

Stephen C. Licht

Christopher Roman

Brenton DeBoef

DEAN OF THE GRADUATE SCHOOL

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## **ABSTRACT**

The University of Rhode Island's Undersea Robotics and Imaging Laboratory (URIL) is focused on finding solutions to create greater access to the deep ocean through additive manufacturing and rapid prototyping novel deep-sea platforms and sensor systems. Presented here are three major projects which have significantly contributed towards these goals, including: the deep-sea camera system "DEEPI", the remote live sensing fiber optic reel system "FOReelS" and a novel fish sampling system which was successfully fielded and has led to multiple potential new species discoveries. These manuscripts and my contributions therein constitute a master's thesis which focuses on the methods in which access to the deep ocean can be expanded, especially by using unconventional means like pressure-tolerant electronic design and smaller, more versatile technology platforms.

## **ACKNOWLEDGMENTS**

My master's study, and subsequently this master's thesis, was funded by the National Institute for Undersea Vehicle Technology (NIUVT). Dr. Brennan Phillips gave me the opportunity to start researching in the Undersea Robotics and Imaging Laboratory mid-summer 2018. I was lucky to continue that summer assistantship into my junior and senior years at URI and even more fortunately into a graduate research assistantship and master's study starting in the fall of 2020. The work presented here would have not been possible without all the love and support of my friends and family as well as all the dedicated scientists and engineers I was able to work with throughout my academic career.

## **DEDICATION**

I'd like to dedicate this work to Thomas R. King. Forever one of my best friends and a man I was lucky to call Grandpa.

## **PREFACE**

The following manuscript and the larger thesis which it seeks to defend, consists of three different peer reviewed, published works and is thus put together using Manuscript Format. Each manuscript will be preceded by a page containing the title, authors, publication status and individual abstract. The references cited within can be found at the end of each section included the manuscript, which each have their own bibliographies.

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