

# **Test Plan**

## **The SATIRE System**

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## **1 Objectives**

This document is intended to detail the activities required to plan and conduct the testing of the S.A.T.I.R.E autonomous underwater vehicle(AUV) system. A task schedule for the team will be laid out for the testing process. The tools, and environment needed for the testing of the system will be identified.

## **2 Background**

Dr. Stephen Wood of the department of Ocean Science and Engineering proposed this project to develop an AUV with the purpose of navigating to a specified location without human control where it will proceed to monitor the area for environmental and/or national security threats. The S.A.T.I.R.E project is scheduled for two years, this being the first year of the project the goal is to develop a working prototype of the AUV platform which will then have additional sensor and analysis capabilities added.

## **3 Scope**

This test plan covers the prototype S.A.T.I.R.E master control system. This includes the internal system sensors for temperature, humidity, hydrogen, and water detection. External sensors for the compass and an inertial navigation system(INS). The inertial navigation system will include movement control, yaw,pitch,roll control, and a ballast/trim system. A navigation/guidance system, a collision avoidance system, and emergency system with a vehicle system and self preservation monitor will be a part of the base prototype.

## **4 References**

S.A.T.I.R.E. System Requirements Document  
S.A.T.I.R.E. System Design Document

## **5 Test Items**

### **5.1 Program Modules**

- Source Code
- Executable Code

## **5.2 Features to be Tested**

- Internal Temperature Sensors
- Internal Humidity Sensors
- Internal Hydrogen Detection Sensors
- Internal Water Detection Sensors
- Compass Interface
- Movement Control
- Yaw, Pitch ,Roll Control
- Ballast/Trim System
- Navigation and Guidance System
- Collision Avoidance System
- Emergency System
- Vehicle System and Self Preservation Monitor

## **5.3 Feature Not to be Tested**

- Science Sensor Systems
- Communication Systems
- Database System

These features are not planned for the initial prototype and will be implemented after the success of the basic system.

## **6 Approach**

The system documentation will be used in the design of all test cases and specified procedures. The hardware team will assist in test design to ensure the all tests meet the system requirements and represent the intended use of the system.

### **6.1 Internal Sensor Testing**

All system sensors will be tested for accuracy. Each sensor will be tested to ensure that the system correctly receives the sensor data and that it is processed accurately.

### **6.2 External Sensor Testing**

The compass interface and INS sensors will be tested for accuracy. Each sensor will be tested to ensure that the sensor data is being properly passed into the system without error and is being processed accurately. The INS sensors will include the Yaw, Pitch, Roll and the Ballast/Trim system.

### **6.3 Navigation/Guidance Testing**

The navigation and guidance system will be tested for accuracy. The system will be tested to ensure that the system correctly and accurately reaches target coordinates. This will be based on GPS coordinates and a dead reckoning system working together.

### **6.4 Collision Avoidance System**

The collision avoidance system will be tested for accuracy and response time. The system will be tested to ensure that obstacles are detected correctly and with appropriate time to take avoidance measures in an underwater environment and with the non-standard vehicle shape.

### **6.5 Emergency System**

The systems emergency responses will be tested to ensure that the AUV appropriately responds to a variety of circumstances that it may encounter in its intended use with the intent to preserve the vehicle and its data. This system will include a Vehicle System and Self Preservation Monitor which will be tested for accuracy to ensure that all data from internal sensors is being collected and anomalous results are being recognized appropriately.

## **7 Pass/Fail Criteria**

The system must satisfy all of the requirements as stated in the S.A.T.I.R.E. Requirements Document. The system must also satisfy the following requirements.

- All sensor data must be collected without loss or damage to its integrity
- All system modules must communicate with the Mission Oriented Operating System(MOOS) without data or message loss.

## **8 Suspension and Resumption Requirements**

### **8.1 Suspension Criteria**

The inability to process communications between modules through MOOS will cause a suspension of all testing activities.

### **8.2 Resumption Requirements**

When a new version of the affected modules is completed Testing will resume.

## 9 Test Deliverables

The following documents will be generated by the team during the testing process.

- System Test Plan
- System Test Design Specifications
- System Test Case Specifications
- System Test Procedure Specifications
- System Test Logs
- System Test Incident Reports
- System Test Incident Logs
- System Test Summary

Copies of all test input and output files should be included with the test documentation.

## 10 Testing Tasks

<b>Task</b>	<b>Predecessor Task</b>	<b>Responsibility</b>	<b>Finish Date</b>
Navigation/Guidance System Simulation	Test Plan		Oct. 31, 2016
INS Simulation	Task 1		Oct. 31, 2016
Internal Sensors Simulation	Task 2		Nov. 28, 2016
External Sensors Simulation	Task 2		Nov. 28, 2016
Emergency System Simulation	Task 4		Nov. 28, 2016

## 11 Environmental Needs

## **11.1 Hardware**

Initial system testing will be done through simulations on a specified test terminal. As the hardware team completes the hardware systems testing will move onto the prototype AUV's onboard hardware.

## **11.2 Software**

All system modules will be operating on MOOS. and will be tested for compatibility.

## **12 Responsibilities**

The S.A.T.I.R.E. software team will be responsible for all testing needs through the development of the S.A.T.I.R.E. prototype.