LESSON PLAN – ADVANCED ROV WORKSHOP

OVERVIEW

This lesson plan is for the introduction and teaching of advanced ROV concepts. Including construction of new electronic circuits and waterproofing components used on an ROV.

AGES

From 12 – 19 years of age.

TIME

4 - 5 hours for lectures and assembly. Then 30 minutes for testing.

LEARNING OBJECTIVES

By the end of this session students will know:

- The advanced concepts of the different technologies available to enhance a basic ROV
- How to use epoxy to waterproof an underwater camera
- How to use epoxy to waterproof an underwater light
- How to assemble a camera interface circuit
- The different epoxies
- How to waterproof a cable join using epoxy
- How to use and clean “O” rings
- How to use a logic probe
- How these enhancements on ROV can help improve its functionality and ability to complete missions in the MATE competition.
- Basic safety requirements of the MATE competition

PRE-REQUISITE KNOWLEDGE

The student must have the following pre-requisite knowledge to do this workshop:

- Have attended a Basic ROV Workshop or understanding the basic concept of ROV
- Understand the basic concepts of buoyancy (floating and sinking objects).
- Understand basic electronics connection and circuit diagrams
- How to solder a simple circuit board and wire connections

MATERIALS/RESOURCES

The following resources are required:

- A suitable 1m x 1m workspace for assembly of electronic components
- Advanced Workshop Kit with instructions
- Camera & Camera Power Supply Kit
- Heat shrink
- LED Light Kit
- Wire Joining Kit
- Access to the following tools:
    - Small hand saw.
    - Soldering Kit
    - Wire Stripper

- Gloves
- Safety goggles
- Electrical Tape
- Wire Cutters
- Monitor and Camera system (For testing of Camera)
- Heat gun
- Camera & Light Jig

- Access to the following materials:
  - Epoxy (2 part)
  - Araldite (2 part)
- A small tank to test the new function of the underwater camera & light

CLASSROOM STRUCTURE

The classroom / workshop should have the following facilities:

- Presentation facilities like an overhead projector.
- Provide a safe, not cramped working environment for the student groups.
- A small tank to test the new camera & light
- Students will be arranged in groups of 2 - 4 individuals.
- One experienced helper is needed for every two teams.

LESSON SCHEDULE

The lesson schedule should be flexible but contain the following:

- Introduction 30 min lecture containing the following information:
  - The different types of enhancements to ROV's
  - Camera
  - LED Light
  - Power Supply
  - Motors
  - Waterproofing connections
  - Epoxy
  - O rings
  - ROV Frame Design
  - The real world application and use of these enhancements
  - Marine Advanced Technology Education (MATE) and the MATE ROV Competition
  - How these enhancements to their ROV can help improve their ROV and to complete missions in MATE competition
- Pre-lesson setup:
  - Distribute the following onto the work benches.
    - Camera
    - Camera Power Supply Kit
    - Heatshrink
    - Epoxy
    - LED Light
    - Resistors
    - Epoxy Mould
      - Assembly instructions for Camera Power Supply
      - Assembly instruction for LED
- 4 - 5 hour construction of new electronic circuits and waterproofing components and lectures

- 30 min testing in the tank to test the function, trim the buoyancy and to practice piloting.

REFLECTIONS

Students should be given an evaluation form containing the following questions after the completion of the lesson.

- What are the technologies available to enhance ROV's capabilities?
- What are the characteristics of an efficient ROV shape?
- What is the importance of health and safety when using Epoxy?
- What is the importance of waterproofing connections?
- What is the basic safety requirements for MATE competition?
- What are the different classes of the MATE competition?