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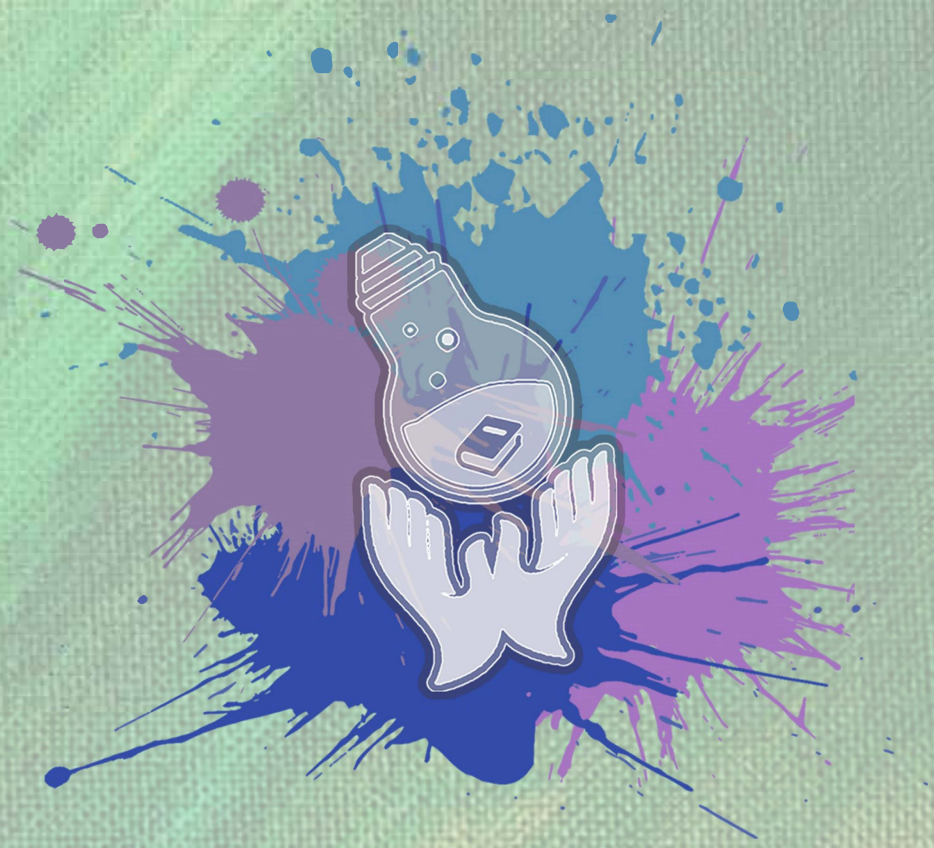

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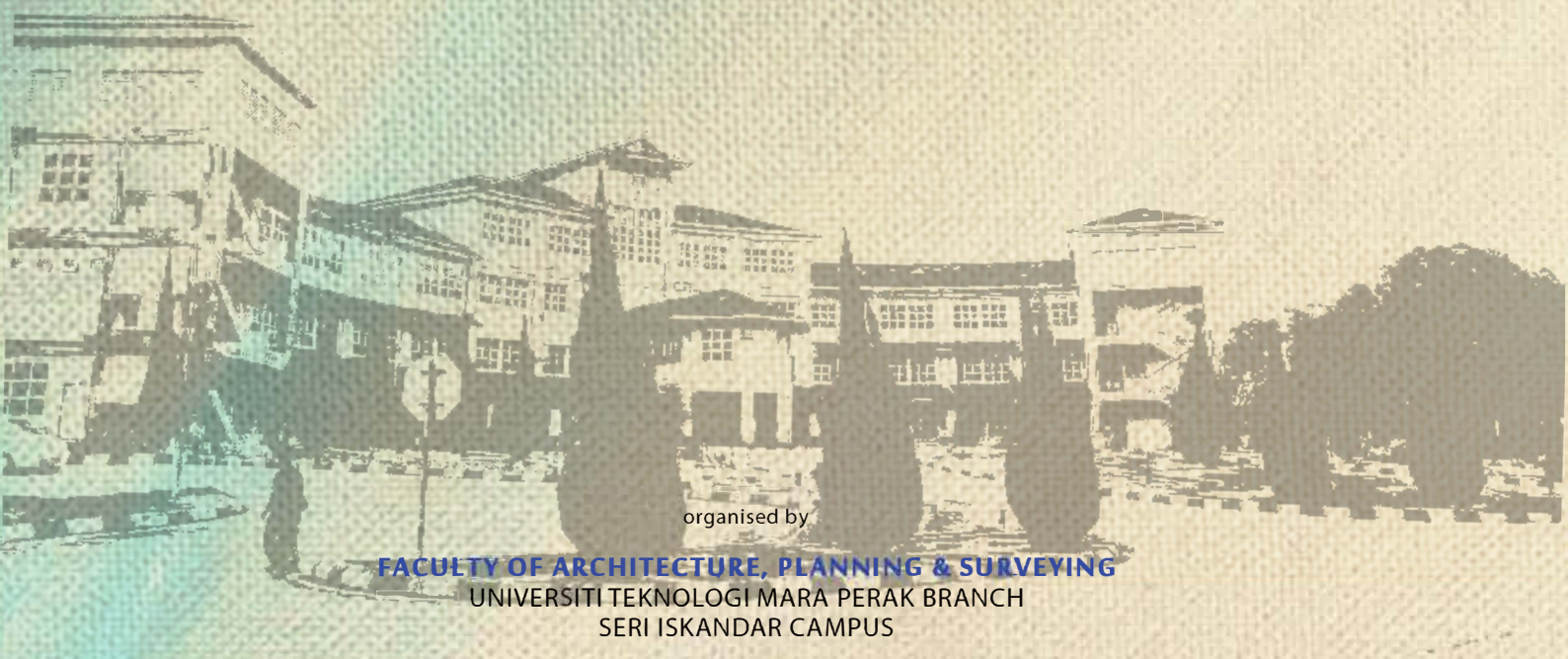

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**FACULTY OF ARCHITECTURE, PLANNING & SURVEYING**
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# DEVELOPMENT OF CONCEPTUAL REMOTELY OPERATED VEHICLE (ROV) FOR PRE-SURVEILLANCE CHECKLIST

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***Abstract:***
Remotely Operated Vehicle or also known as ROV in short is a computer-controlled system operating underwater. It can be controlled from far from on the ship or offshore. This remotely operated underwater vehicle can move in many ways based on its design and application. It can move, drifts, dives or glides from the sea surface to ocean depth controlled and operate from a far. Usually it is designed to operate under sea level and come with basic design. With the latest technologies, it is built with more efficient design that can operate better beyond any level of the sea. Other than that, remotely operated vehicle allows scientist to conduct experiment to collect data elsewhere in the deep ocean and controlled it on the surface or on a ship. They usually used for commercial purpose. Oil drilling and subsea drilling companies use the assistance of remotely operated underwater vehicle for the purpose of checking the appropriate oceanic area to suit their business necessity. Some of them are designed for research and exploring purposes. Additionally, military also used this autonomous underwater vehicle technology to surveillance what's going on in the ocean to find out whether there are any booby-traps set in the ocean floor. When it comes to military usage, an ROV is the best scouting technology that can be used for underwater purposes. However, ROV can be used for hobby by peoples who want to surveillance the deep water or fish.

***Keywords:***
Remotely Operated Vehicle; ship; drift; autonoumous underwater; oil drilling

## 1.0 INTRODUCTION

Due to extreme difficulty in gathering sub aquatic observations and complexity to review underwater surveillance, modular ROV is a technology solution to support the activities. It covers the majority of the planet's surface, influence our climate, countless species of plants and animals, and important geological processes. Since the underwater environment is very dark and much of its biology and geology must be studied at a very close range. At greater distances, even used powerful lights fail to illuminate a scene sufficiently. The goal of Remotely Operated Vehicles (ROVs) is to improve underwater robot technology in order to enable more scientific exploration in the oceans as in Figure 1.

Figure 1 Remotely Operated Vehicles (ROVs)

These vehicles are tethered to a surface ship or offshore platform by an umbilical cable, which provides control signals, and power. They are employed in the offshore oil and gas industries, salvage and recovery, and ocean science, as well as in military mine. A human operator (pilot) provides vehicle motion control on the surface water, who views the underwater environment through a video camera

for short-range visual feedback and scanning sonar is often added for longer-range information. This type of vehicle is well suited for performing expensive and monotonous tasks such as ocean water quality, and geological survey. ROV's could also be utilized for ship yard and underwater inspection tasks and most importantly, countermeasures and neutralization, where there is a potential human for loss of life. The ocean has low transparency and cannot observe the whole deep sea in detail from the surface because not easily to survey in deep sea, survey observation with the ship is not enough. However, the water pressure cannot step into the deep sea easily because one atmospheric pressure is increasing every 10m we are diving. So that, the AUV will solve this problem (Ognawala, Pretschner and Limmer, 2016).

## 2.0 LITERATURE REVIEW

Design process has been proven through numerous attempts by using sophisticated design tools. Possible integration of its functions, such as assembly techniques in Virtual Environments, makes virtual laboratories in high quality. This set of laboratories can be used to lower the expenses (assembly costs) in training and not just for practical exercises in distant education (Zona Kostic, Dusko Radakovic, Aleksandar Jevremovic, 2012).

Gheorghita, Vintu, Mirea, & Braescu, (2015) explained on how to understand the quad copter control system that is based on the dynamical and kinematic design. The control system contains two reference systems, related to the earth and the body frame of ROV itself.

## 3.0 METHODOLOGY

In designing the modular ROV involved the camera sensors, battery, ballast, motor and Bluetooth module to suits the aerodynamic ROV prototype with the coding in Arduino Circuit Board. The process is shown in Figure 2.

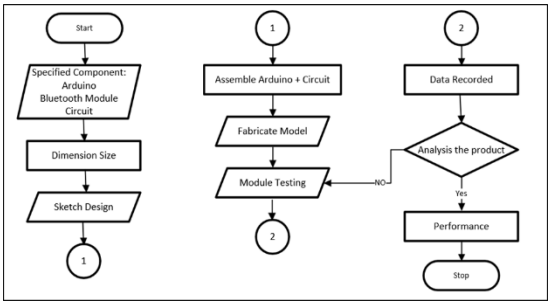



Figure 2: The process flow of ROV design

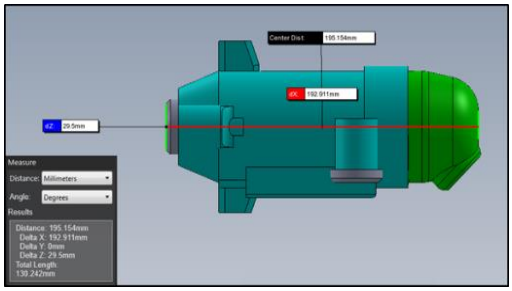


Figure 3: ROV in solid work

## 4.0 ANALYSIS AND FINDINGS

A completed ROV shown in Figure 3 has a capability to dive (submerged), surfacing, glides and turns with the minimum power consumption, battery capacity and load test.

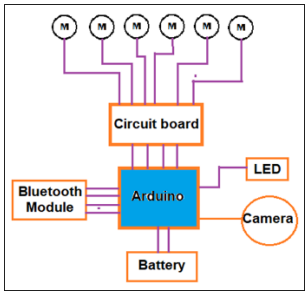



Figure 4: Main Components of ROV Simulation

Simulation results provide the virtual movements of ROV as shown in Figure 4. Thus overall performance shown in Table 1. Table 1 shows the operating time of the ROV. It is seen to have the first 30 second, the ROV can move 0 meter to 2 meters with speed 0.06 m/s. In 1 minute it can move up to

3.5 meter. In complete ROV, it can operate with full battery charged is 15 meters in 300 second up to 400 second. Figure 5 shows the discharge capacity (mAh) in capacity against time. The discharge is directly proportional with time when the ROV is in the operation. From this result notifed that more amount of capacity of battery, more time ROV can be operated.

Subsea operated with image captured is shown in Figure 6, during the operating time.

Table 1: Operating Time

| Time (Second) | Distance (meter) |
|---|---|
| 7 | 0.5 |
| 15 | 1 |
| 22 | 1.5 |
| 30 | 2 |
| 45 | 2.5 |
| 60 | 3.5 |
| 120 | 7 |
| 300 | 15 |

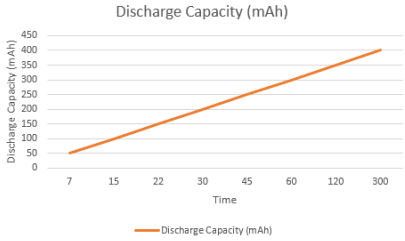
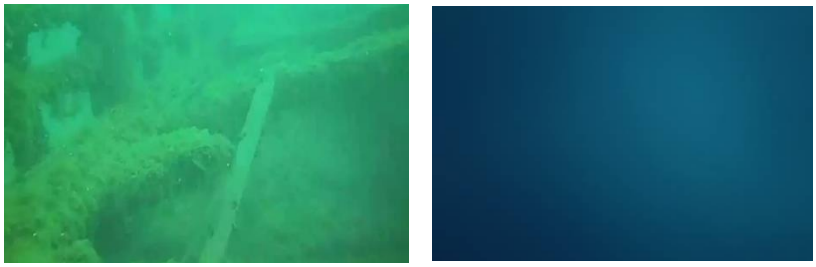



Figure 5: Discharged Capacity



(a) (b)

Figure 6 (a) and (b): Image captured at 11.00am and 7.00pm, respectively.

## 5.0 CONCLUSION

The modular ROV involved design process and electrical components specifications. The development can demonstrate the movement of ROV which leads to the underwater surveillances and activities. The prototype is used to verify the performance of modular ROV controller at cost effective.

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