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PROPOSAL

PENELITIAN DOSEN TRILOGI

Design and Control Underwater Robot Based on Smartphone

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DAFTAR ISI

RINGKASAN

Underwater robot is a type of robot specially designed and configured to operate underwater, especially in seas, rivers, and lakes. The main purpose of underwater robots is to perform various tasks and missions underwater, which are often difficult or dangerous for humans to carry out. The method used to design the underwater robot is with a smartphone control system. The robot can move according to the user's commands by being connected through a internet network, allowing the robot and smartphone to be interconnected. This underwater robot is equipped with a camera and two lamps, and the images captured by the camera are displayed on a personal computer. Meanwhile, the lights are controlled by the user using a smartphone. The research results show that the underwater robot can be controlled to a depth of 0.5 meters with an average button press speed of 1 second in floating conditions and 2.9 seconds at a depth of 15 centimeters. The application of this robot can take photos, display good images, and monitor activities underwater. In addition, the captured image from underwater robot are also good and the image produced are clearly visible both on land and in the water

Keyword : Blynk, Smartphone, Underwater Robot, WiFi

BAB I. PENDAHULUAN

1.1. Latar Belakang

Indonesia has a very wide water area that reaches more than 3000000 Km2 . The breadth of Indonesian waters certainly has abundant fishery potential such as various freshwater fish in lake waters. The large role of Indonesian waters certainly needs a monitoring system to be able to monitor the conditions and potential of underwater fisheries, one of which conditions and potential of underwater fisheries, on of which is by using an underwater robot equipped with camera. So that, every condition and potential of fisheries can always be monitored without having to dive into the water. Underwater robot is a robot that is intended specially for activities in the water. Where this robot is usually used to make observations or underwater surveys. Based on the working system, underwater robots consist of two types, namely AUV (Autonomous Underwater Vehicle) and ROV (Remotely Operated Vehicle). Autonomous Underwater Vehicle (AUV) is an underwater robot that is autonomous based on the program that has been given to the robot chip [1]. This robot makes it easier for users to operate, which it can send data to users wirelessly [2]. Meanwhile, Remotely Operated Vehicle (ROV) is an unmanned underwater robot that can maneuver in water and it’s controlled by an operator

above the water surface [3]. The application of ROV can help humans in various research and engineering activities in the water [4]. In this research, an underwater robot based on ROV is designed which it's controlled using a smartphone connected to WiFi network. Electronic communication underwater Robot [16],[21]. An underwater electronic communication robot, often referred to as an underwater communication system or underwater robot, is a specialized device designed to transmit and receive information in aquatic environments. These robots play a crucial role in various applications, including ocean exploration, environmental monitoring, underwater research, and industrial tasks. Technology continues to increase, ranging from means of communication to means of transportation. Technology can provide comfort and convenience for humans to carry out activities. Along with the rapid development of technology, a concept has emerged that can help human activities with the help of network commonly referred to as IoT [5]. Internet of Things (IoT) is a concept where objects can communicate with each other such as transferring data using the internet network in real time without involving human intervention [6][7]. One of the application of IoT can be done by using the blynk application on a smartphone. Where the blynk application can control various controllers such as Arduino, ESP32, ESP8266, Raspberry, etc. With blynk application, it is easier to control other devices using only a smartphone. So users can control anything remotely by staying connected to the internet. Blynk itself provides a limit of 2000 points for each new user in accessing the features in the application without having to pay (free) [8]. However, if we want to use it on a commercial scale and for a long period of time, we need to add limit points by buying an energy pack that is available on the blynk application.

1.2.Rumusan Masalah

Berdasarkan uraian latar belakang serta identifikasi masalah penelitian, maka dapat di rumuskan masalah dalam penelitian ini sebagai berikut:

1.Bagaimana merancang underwater robot?

2.Pengukuran nilai tegangan yang dihasilkan?

1.3. Tujuan dan Manfaat Penelitian

Adapun tujuan dan manfaat dari penelitian ini adalahsebagai berikut :

1.Merancang dan merancang underwater robot.

2.Menentukan nilai tegangan yang dihasilkan.

1.4. Target Luaran Penelitian

Target luaran dari penelitian ini diantaranya adalah; (1) publikasi pada jurnal nasionalnasional terakreditasi, (2) publikasi pada seminar nasional dan (3) menjadi bahan dan referensi untuk temu ilmiah dalam acara seminar tingkat lokal atau nasional.

Tabel 1.1. Rencana Target Capaian Tahunan

No	Jenis Luaran				Indikator Capaian		
	Kategori	Sub Kategori	Wajib	Tambahan	TS	TS+1	TS+2
1	Artikel ilmiah dimuat di jurnal	Internasional berputasi					
		Nasional Terakreditasi	V		submitted	published	
		Nasional tidak terakreditasi					
2	Artikel ilmiah dimuat di prosiding	Internasional Terindeks					
		Nasional	V		published		
3	*Invited speaker* dalam temu ilmiah	Internasional					
		Nasional					
4	*Visiting Lecturer*	Internasional					
5	Hak Kekayaan Intelektual (HKI)	Paten					
		Paten sederhana					
		Hak cipta					
		Merek dagang					
		Rahasia dagang					
		Desain Produk Industri					
		Indikasi Geografis					
		Perlindungan Varietas Tanaman					
		Perlindungan Topografi Sirkuit Terpadu					
6	Teknologi Tepat Guna						
7	Model/Purwarupa/Desain/Karya Seni/Rekayasa Sosial			V	draft		
8	Buku Ajar (ISBN)						
9	Tingkat Kesiapan Teknologi (TKT)			V	3	5	

BAB II. TINJAUAN PUSTAKA

2.1. UNDERWATER ROBOT

Robotic manipulators have been increasingly becoming adept at industrial applications and interacting with humandesigned spaces. Current capabilities extend to tactile exploration of unknown objects (e.g., [1], [2]), reasoning about complex manipulation objectives and motions (e.g., [3], [4]), and, among many other, human-robot and robot-robot cooperation (e.g., [5], [6]). Nonetheless, the possibility of adopting these advances in underwater applications seems to be far behind the ease of doing so in humanoid, terrestrial, and aerial robots. It is natural to wonder: what are the challenges that impede striving the potential of underwater manipulation to a fully autonomous level? Understanding the limitations is key to the prospect of manipulators facilitating the strenuous, or even impossible, human labor in underwater recovery, intervention, and maintenance tasks.

BAB III. RESEARCH METHODS

3.1.Underwater Robot System Requirements Design

Designing an underwater robot system requires careful consideration of various factors to ensure its functionality, reliability, and efficiency in the challenging underwater environment.

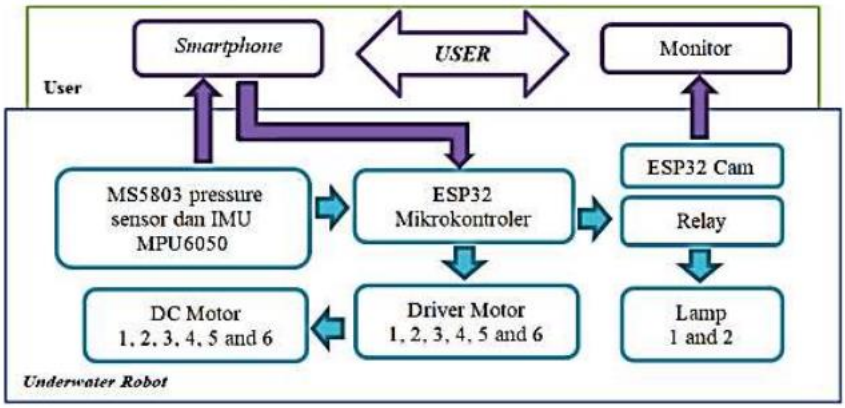


Figure. 1 Underwater Robot System Block Diagram

In this system consists of two parts of the function, where the first function is performed by the user and the second function is performed by the system. 1. Functions performed by user In this part of the function is carried out directly by user, where user control the system using a smartphone. In addition, the user can see and monitor data from pressure sensor in the form of depth position robot. Monitoring movement and stability of the of the robot by

looking at roll and pitch data from IMU MPU6050 contained in blynk application display. Then user can also monitoring underwater conditions in the form of streaming video from those captured by ESP32 Cam. 2. Function performed by the system This function is carried out by the system such as reading commands from user via a smartphone, reading roll and pitch data values of IMU MPU6050 and reading data from pressure sensor which is the processed by DOIT ESP32 DEVKIT. Furthermore, the reading of data is poured in output of PWM value on the DC motor and the light condition.

3.2. Hardware Design

The following is a series of hardware on the underwater robot

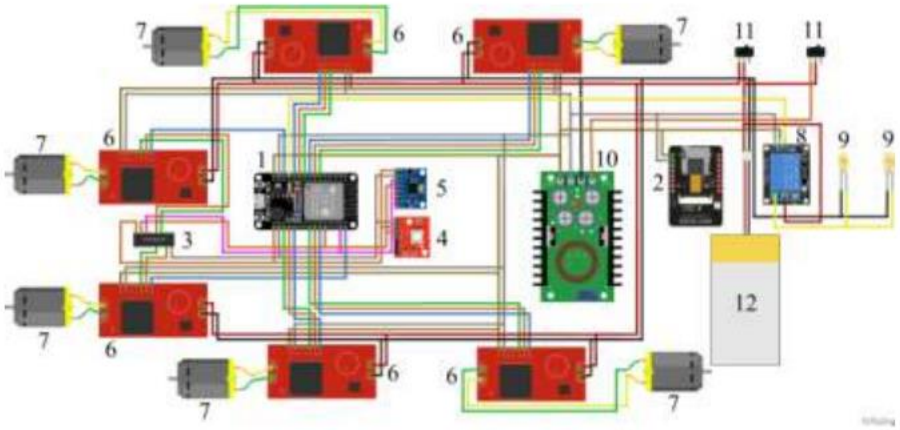


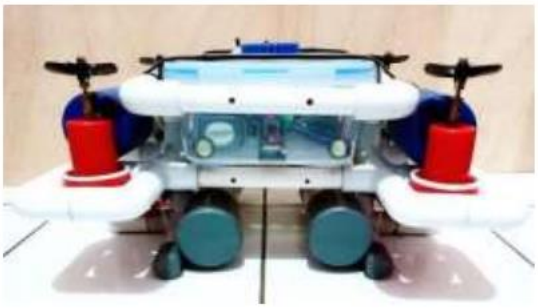
Figure. 2 The Overall Circuit of Underwater Robot Hardware

The explanation of the components contained in Fig. 3, including: 1. DOIT ESP32 DEVKIT is used as the main controller of the control system. 2. ESP32 Cam and OV2640 camera are used as image and video image data capture. 3. PCF8574 IO module is used as an additional GPIO pin. 4. MS5803 pressure sensor is used to measure depth position robot. 5. IMU MPU6050 sensor module is used to measure the tilt of robot and maintain the stability of robot. 6. VNH2SP30 driver motor is used as a DC driver motor. 7. 1100goh bilge pump DC motor is used to drive the robot. 8. Relay is used as a regulator of condition the lamp. 9. Lamps is used as a robot lighting. 10. Buck converter XL4015 is used to lower voltage from 11.1 Volt to 5 Volts. 11. On off switch is used to disconnect and connect electric current. 12. LiPo (Lithium Ion Polymer) battery is used as a voltage source for the robot

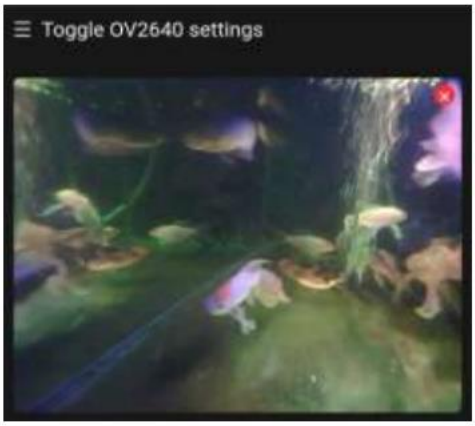
BAB IV.

HASIL PENELITIAN

4.1. Hasil perancangan



Rancangan robot



Hasil foto robot

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