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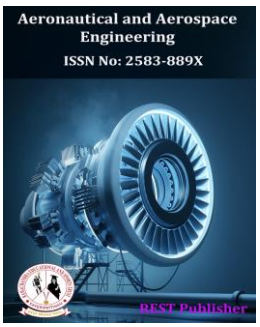

Space and Underwater Robots using the SPSS Method

***Chinnasami Sivaji, M. Ramachandran, Vimala Saravanan, Ramya Sharma**

REST Labs, Kaveripattinam, Krishnagiri, Tamil Nādu, India.

Corresponding Author Email: chinnasami@restlabs.in

Abstract. *Ocean research requires the use of underwater robots, such as controlled boats (ROVs) and autonomously underwater vehicles (AUVs). These robots can investigate oceanic regions that are too hazardous or challenging for people to visit. Ocean research requires the use of mechanical diggers, including au vehicles (AUVs) and remotely piloted submersible vehicles (ROVs) (AUVs). These machines can investigate oceanic regions that are too hazardous or challenging for people to visit. Underwater robotics is not only used in rescue and search, it is already used in marine resource exploration, undersea terrain mapping and construction and maintenance of marine engineering structures. A dash cam, propulsion system, and lighting are standard on all ROVs. Depending on the necessary criteria, additional apparatus such as a handling arm, water sampling, clarity, emissivity, temperature, and depth measurement instruments is added. Since Robots that operate underwater must be waterproof since both ROV and AUV robots involve computers and electronics. This indicates that since the equipment is housed inside of an enclosure that forbids water from entering, water won't harm it. Yet, such a large area poses several difficulties, both above and below the surface. in monitoring, exploration and underwater operations, such as erosion. Turbulent water, low temperature and high pressure. Realistic controls require advanced theory, methodology, and equipment for underwater robots. Underwater acoustic sensors are the most intriguing sensing technique for aquatic robotic use. Acoustic underwater sensors often fall into one of the following two categories: both acoustic location sensors and acoustic ranging/imaging sensors. The underwater robot can successfully detect all ships entering a port and ensure that drug dealers are not attaching any packages to the underwater sections. Movement control of a system for underwater micro robots by developing a PSO path planning optimization system and a VR Control system for three-dimensional space. Artificial intelligence, network technology, and underwater medicine can all benefit from using this kind of submerged micro robot system. an array of micro robotics for drugs. Every A micro robot with smart materials can be used for transportation Some drug injection task and micro robot The most difficult underwater activities, such context identification and analysis, may be finished by the system. Initially, we employing a new spin particle to design the architecture of a micro robot system and an AVR control system. A technique to particle search using paths on the road, determined to dodge the obstruction The shortest robot and one t path to three Robots Smart Material ICPF (Ionic Conducting Polymer Film), let's study These types of underwater cooperative techniques A novel micro robot system with a single mother Several micro robots with submarine and ICPF actuators. SPSS statistics is multivariate analytics, business intelligence, and criminal investigation data management, advanced analytics, developed by IBM for a statistical software package. A long time, spa inc. Was created by, IBM purchased it in 2009. The most contemporary versions are marketed under the designation IBM SPSS statistics. Control signal of micro robot turning around, Fish-like underwater micro robot moving forward, Structure of the micro robot system and structure of AVR control system. The Cronbach's Alpha Reliability result. The overall Cronbach's Alpha value for the model is .860which indicates 86% reliability. From the literature review, the above 50% Cronbach's Alpha value model can be considered for analysis. Emotional Intelligence the Cronbach's Alpha Reliability result. The overall Cronbach's Alpha value for the model is .860which indicates 86% reliability. From the literature review, the above 50% Cronbach's Alpha value model can be considered for analysis.*

Keywords: *Control signal of micro robot turning around, Fish-like underwater micro robot moving forward, Structure of the micro robot system and structure of AVR control system.*

1. INTRODUCTION

The underwater tiny robot system can be utilized for artificial intelligence, multi-micro robot medicines system management, and underwater medical knowledge networks. Each micro-smart robot's material can be utilized to carry out a specific medication injection operation, and the nanometer system can carry out more difficult underwater activities including environmental analysis and detection. First, we create the framework for a VR controller and a micro robot system. To find the shortest path in one robot and three robots, a novel circular particle path search approach is used to look for particles mostly on path to avoid the obstruction. Finally, we use the PSO algorithm to optimize the

flight using the target region. The path-planning and optimization strategy for the submersible micro-robot in 3-D space is practical and effective, according to the simulation findings [1]. Underwater communication presents a variety of unique challenges for both research fields, including: (1) the importance of mass constraints underwater; (2) the rarity of attaching vehicles (such as ROVs in subsea applications); (3) the need for platform design to incorporate high-pressure, pernicious environments underwater, as opposed to the vacuum of space; and (4) the increased turbulence caused by underwater currents. Examining the contrasts and parallels among the two various exploration approaches is the key to increasing the dependability of nuclear submarines as analogues for space exploration [2]. However, underwater restoration and visual acquisition are challenging without artificial intelligence, which has consequently been the focus on development in deep-sea exploration. Underwater exploration comprises a variety of industries such as offshore building and petroleum exploitation. Underwater image and video enhancement is a significant area in this image processing field. The underwater environment presents particular challenges when taking pictures and films, such as low resolution, uneven colour, and blurring, which makes computer analysis and human interpretation challenging [3]. Six produced motions based on the parameter values outlined in the preceding paragraph were used in underwater experiments to assess each torques with the robot leg. Each parameter value appears in a parameter space, where all scores are rescaled based on how much drag is being experienced during underwater experiments. The rebuilt parameter space defines a method to minimise the number of parameters. The expanded version of further SPG (ESPG) was then introduced, and a comparison between the original SPG and ESPG was made [4]. A variety of bio-inspired underwater robots have been created by taking inspiration from aquatic animals in nature, including the fish robot, snake robot, salamander robot, dolphin replicant, and turtle robot. These studies have gradually advanced the development of underwater robotics because they primarily concentrate on dynamic modelling locomotion control swimming abilities and sensing. robots for the ocean floor and organised classification. Underwater robots may successfully synchronize their mobility in three-dimensional water space through electrical communication, as shown by the robotic communication system's overall performance in environments with still water, flowing water, obstacles, and natural water, and by three (3) [5]. Because aquatic species can move quickly, it may be claimed that designing underwater robots using the fish locomotor system is an efficient approach. Many of the fish-like robots that have been created so far have complicated systems, are large, and require modern technology in addition to cranks and motors for motion control. The ability to execute such complicated motion is supposed to require a device with both the mobility of a fish. An innovative type of actuator that is distinct from conventional motors is being studied for this function [6]. There are currently underwater manipulators on the market. Using empirical relationships based on strip theory, physicochemical parameters of UVMS are computed. These values are trustworthy and may be employed for further development because this method has been validated using the literature that is currently available. The geometrical layout and structure of UVMS are used to determine Many factors, such as inertia, the pivot point, and the centre of buoyancy [7]. This procedure takes a long time since controlling an underwater robot is more difficult than controlling a robot on land. A multi-channel communication network would therefore be more appropriate. The system has two functions. First, it allows the robot to relay data to multiple robots at once. Second, different types of data can be transmitted using communication channels, which can improve the communication system's overall effectiveness. Robotic communication underwater. A telecommunication distance of up to 3 metres is still easily attainable based on our tests. Depending on how much saltwater absorbs light, a green or blue laser can be employed. Being a point-to-point communication, optical free-space communication is [8]. Deep-sea areas use a variety of robot kinds for underwater mining. Similar to the ground-breaking work being done in mining coal by significant mining corporations, but in a different setting. Telerobots allow control of mining equipment thousands of metres below the surface from control centres on the surface. Tele robotic robots may now be utilised for ore mining deep below because to a mix of advanced high-bandwidth connection, specific control systems, and on-board electronics. The use of these tele-robot technologies has been successful in underground operations, and open pit mining activities are now being examined [9]. For each application, underwater robots are designed differently in terms of their shape, size, launch systems, and arrangement. For demining activities, handlers are necessary. Perhaps a smaller, more agile design would be desirable for a robot used for sensing purposes so that it may fit into tighter areas. A streamlined shape may also be necessary for high-speed underwater motions. vehicles and robots subaquatic. A vehicle often has two propellers: one for horizontal propulsion and another to facilitate vertical motion. The fact that paddle wheel propellers disturb the water around the underwater vehicle is a significant drawback [10]. Robotics underwater takes a lot of time. This is made possible by obtaining power from solar and fuel cell technology while still on the ground. A mussel inhabits the sea floor at a depth of 15 metres. Each mussel has essentially identical underwater communication tools to a pad: wireless LAN, Bluetooth, and audio communication. A mussel will employ Blue Light, another short-range water communication technique created as part of the Go Ro programme and based on high-frequency light. In addition, a novel and biological idea of "electrical sensing" (see Section 3.1) will be used to get beyond the difficulties in communication and navigation posed by the Venice lagoon's highly structured environment [11]. The Smart-E water robot constructs a complicated platform out of multiple prototype parts in order to create a highly nimble autonomous vehicle. The robot is designed to be smaller and lighter than existing AUVs in order to be handled by a single person. As a result, several parts are highly specialised and suitable for usage in small underwater robots. Software design is accelerated greatly by this reuse. Even between distributed nodes on various devices linked through Ethernet or Wi-Fi, node-to-node communication utilising TCP/IP

packages is made possible by a node-based design [12]. By using soft-body components rather than precise control, underwater robots may manage large-scale, interaction and movement between humans and robots in highly erratic, unstructured environments (Mortl et al., 2012; Wang and Ida, 2015; Woodman et al., 2012). Underwater robots for sale can indeed travel safely in wide ocean areas, but they must constantly avoid unexpected collisions while travelling close to the ocean floor especially near submerged buildings [13]. Experiments for underwater docking Due to the system's complexity, we do not suggest this method. A cone receiver-based system is more dependable. The recommended docking system has a fundamentally different goal than underwater docking. Howard put out an idea for powering the space station. In contrast, one of the goals of underground capacity to operate in partial shade or direct sunshine, and the ability to provide data to the guidance, navigation, and control (GNC) system at an appropriate rate are all properties of the localization sensor that are discussed in the study. Drive the car sensibly [14]. Throughout the past ten years, interest in the field and submarine robotics research has increased. AUVs are now utilised for a variety of purposes. Underwater mapping for both military and civilian purposes, structural examination of power facilities, and the search for missing people following nuclear or pipeline leaks are some of the difficulties that frequently arise in this field. For autonomous cars and robots to recognise and categorise distinct objects, which enables them to map and comprehend their surroundings, research in this area is crucial [15]. A superior speed control will be achieved by an underwater robotic system. It is common knowledge that building a reliable mathematical representation of an AUVMS is particularly challenging because to the hydrodynamic parameters' uncertainty and the dynamical characteristics' highly coupled, nonlinear, and time-varying nature. Underwater robotic applications can benefit from in these situations, intelligent control techniques like fuzzy logic control (FLC) are used. The disturbance estimations' output can be used to feed forward correct for disturbances, which will enhance tracking performance and lead to smoother control actions [16]. Unique indicators are found everywhere, both above and below the surface. Since they are transponders in this instance, the markers' exact locations must be known. Robotic transponders are able to recognise the signal and determine how far away each marker is. The robot must also gather details on its own motion, including flow rate and orientation [17]. Although underwater multibeam navigation systems have been developed, their usefulness has been restricted by the submerged tank's high rates of reflection or the requirement that each unlimited access robot be equipped with a moisture sensor or emitter (or even astronaut). Underwater robot movement requires navigational assistance. The system may be utilised without modifying the vehicle and can even monitor robots or scientists (divers) without the need for specialist equipment to there were navigation because all VPS cams and supporting gear are located outside of the vehicle [18].

1. Material and Method

Control signal of micro robot turning around: Control system The Powerful Processor that directs the robot's operations. Sensors: A part that supplies electrical signals so that a robot can communicate with its environment. Actuators: The robot's motorized components that move it. Peripheral Interface Controllers, sometimes known as PICs, are a kind of microcontroller parts used in the creation of electrical, robotic, and similar devices. A robotic system's motion control software determines how a robot should move to carry out predetermined tasks. Robot arms operate through the action of spinning and sliding joints, whereas robotic systems navigate through mobility and steering.

Fish-like underwater micro robot moving forward: It has a silicone tail and a 3D printed body, making reproduction simple and economical. It is fueled by a lithium battery. So Fi, a fish-like creature measuring 17 cm long (18.5 inches), glides through the water with ease. The artificial fish can swim at a speed of half its length per second. The best swimming robotic pets in real life, the new ZURU Robot Fish, measure 8 cm in seconds. Using ZURU's water triggered technology, these fish come to life like magic when you drop these into the water. See them swim in 6 various directions - dive up to 6 feet! Our goal is to create a submersible micro robot that has adaptability at low voltage, rapid response, and physical security. We present a prototype version of an undersea micro robot that uses an ICPF (Ion Carrying Polymer Film) actuators as a tilt actuator to produce swimming motions with three degrees of freedom. A buoyancy change for a small robot paddling system in water or other aqueous media, along with a biocompatible fish-like micro robot, have been developed.

Structure of the micro robot system: Links and joints make up the basic framework of industrial robots, which is mostly made up of robot arms. The elbow and shoulder joints, as well as the bones that link those joints, are the counterpart of a robot's joints in relation to a human body. A fundamental conventional robot is made up of a moveable body structure, a motor of some kind, a motion detector, a power source, and a computational "brain" that manages all of these components. In essence, robots are artificial animals that replicate both human and animal behavior. Robotic systems can be divided into three categories: manipulator robots, mobile robots, and control and data collection robots. The manufacturing sector is where manipulator robot systems are most frequently deployed.

structure of AVR control system: Even when the public input voltage, period, or system load varies significantly, the automated voltage regulator's (AVR) objective is to preserve a constant voltage and power line heating or cooling to the equipment load under a range of circumstances. AVRs are electronic devices that maintain a consistent voltage level for connected electrical equipment under the same load. The AVR controls voltage fluctuations to deliver steady, dependable power. AVRs are voltage-regulating devices that shield your electronics not just from power surges but also

from the frequent power fluctuations found in residential settings. Your gadget will receive stable power if you take precautions against power fluctuations, which will prolong the lifespan of your equipment.

Method: SPSS Statistics is a statistical control Advanced Analytics, Multivariate Analytics, Business enterprise Intelligence and IBM a statistic created by a software program is a package crook research. A set of generated statistics is Crook Research is for a long time SPSS Inc. Produced by, it was acquired by IBM in 2009. Current versions (after 2015) icon Named: IBM SPSS Statistics. The name of the software program is to start with social Became the Statistical Package for Science (SPSS) [3] Reflects the real marketplace, then information SPSS is converted into product and service solutions Widely used for statistical evaluation within the social sciences is an application used. pasted into a syntax statement. Programs are interactive Directed or unsupervised production Through the workflow facility. SPSS Statistics is an internal log Organization, types of information, information processing and on applicable documents imposes regulations, these jointly programming make it easier. SPSS datasets are two-dimensional Have a tabular structure, in which Queues usually form Events (with individuals or families) and Columns (age, gender or family income with) to form measurements. of records Only categories are described: Miscellaneous and Text content (or "string"). All statistics Processing is also sequential through the statement (dataset) going on Files are one-to-one and one-to-one Many can be matched, although many are not in addition to those case-variables form and by processing, there may be a separate matrix session, there you have matrix and linear algebra on matrices using functions Information may be processed.

2. RESULTS AND DISCUSSION

TABLE 1. Descriptive Statistics

	N	Range	Minimum	Maximum	Sum	Mean		Std. Deviation	Variance
Control signal of micro robot turning around	80	4	1	5	245	3.06	.153	1.372	1.882
Fish-like underwater micro robot moving forward	80	4	1	5	243	3.04	.184	1.642	2.695
Structure of the micro robot system	80	4	1	5	212	2.65	.170	1.519	2.306
structure of AVR control system	80	4	1	5	238	2.98	.182	1.630	2.658
Valid N (listwise)	80								

Table 1 shows the descriptive statistics values for analysis N, range, minimum, maximum, mean, standard deviation Control signal of micro robot turning around, Fish-like underwater micro robot moving forward, Structure of the micro robot system and structure of AVR control system this also using.

TABLE 2. Frequencies Statistics

		Control signal of micro robot turning around	Fish-like underwater micro robot moving forward	Structure of the micro robot system	structure of AVR control system
N	Valid	80	80	80	80
	Missing	0	0	0	0
Mean		3.06	3.04	2.65	2.98
Std. Error of Mean		.153	.184	.170	.182
Median		3.00	3.00	2.00	3.00
Mode		2	5	1	5
Std. Deviation		1.372	1.642	1.519	1.630
Variance		1.882	2.695	2.306	2.658
Skewness		.247	.062	.373	.113
Std. Error of Skewness		.269	.269	.269	.269
Kurtosis		-1.216	-1.620	-1.346	-1.638
Std. Error of Kurtosis		.532	.532	.532	.532
Range		4	4	4	4
Minimum		1	1	1	1
Maximum		5	5	5	5
Sum		245	243	212	238
Percentiles	25	2.00	1.00	1.00	1.00
	50	3.00	3.00	2.00	3.00
	75	5.00	5.00	4.00	5.00

Table 2 Show the Frequency Statistics in Space and Underwater Robots Control signal of micro robot turning around, Fish-like underwater micro robot moving forward, Structure of the micro robot system and structure of AVR control system curve values are given.

TABLE 3. Reliability Statistics

Cronbach's Alpha Based on Standardized Items	N of Items
.860	4

Table 3 shows The Cronbach's Alpha Reliability result. The overall Cronbach's Alpha value for the model is .860 which indicates 86% reliability. From the literature review, the above 50% Cronbach's Alpha value model can be considered for analysis.

TABLE 4. Reliability Statistic individual

	Cronbach's Alpha if Item Deleted
Control signal of micro robot turning around	.907
Fish-like underwater micro robot moving forward	.839
Structure of the micro robot system	.758
structure of AVR control system	.770

Table 4 Shows the Reliability Statistic individual parameter Cronbach's Alpha Reliability results. The Cronbach's Alpha value for Control signal of micro robot turning around - .907, Fish-like underwater micro robot moving forward - .839, Structure of the micro robot system- .758 and structure of AVR control system - .770 this indicates all the parameters can be considered for analysis.

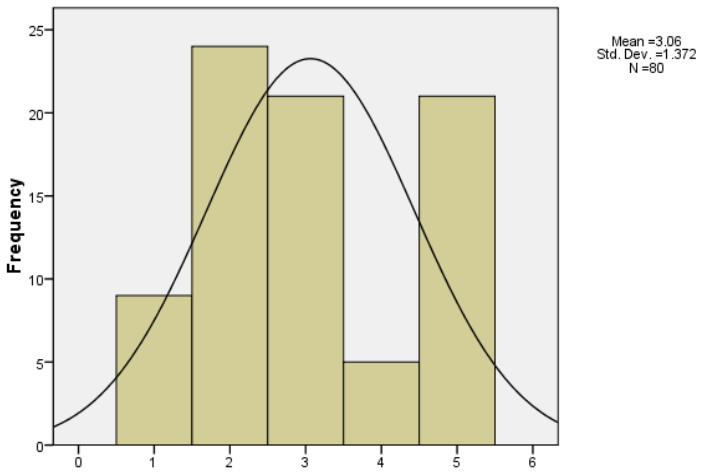

FIGURE 1. Control signal of micro robot turning around

Figure 1 shows the histogram plot for Control signal of micro robot turning around from the figure it is clearly seen that the data are slightly Left skewed due to more respondent chosen 2 for Control signal of micro robot turning around except the 2 value all other values are under the normal curve shows model is significantly following normal distribution.

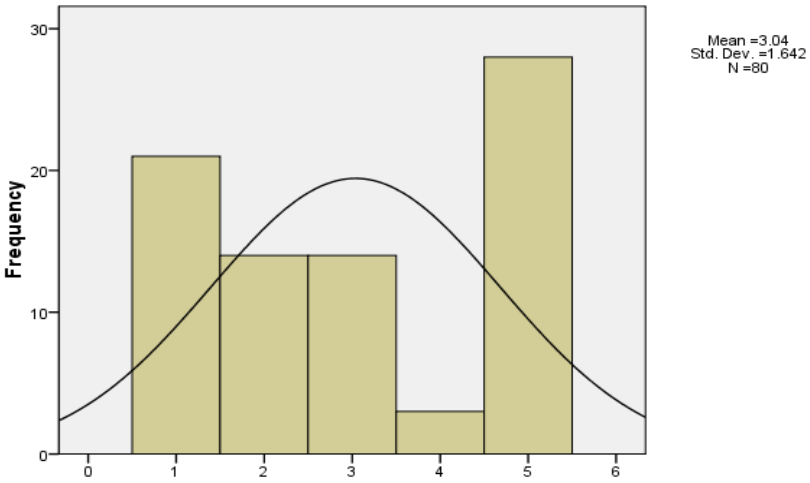

FIGURE 2. Fish-like underwater micro robot moving forward

Figure 2 shows the histogram plot for Fish-like underwater micro robot moving forward from the figure it is clearly seen that the data are slightly Right skewed due to more respondent chosen 5 for Fish-like underwater micro robot moving forward except the 2 value all other values are under the normal curve shows model is significantly following normal distribution.

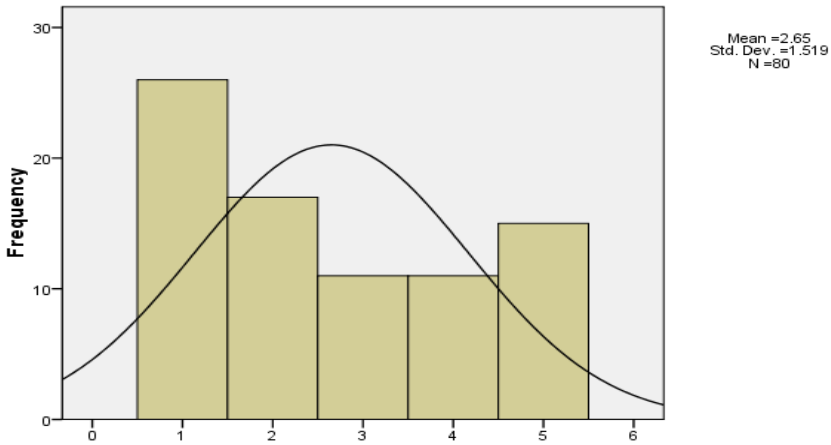

FIGURE 3. Structure of the micro robot system and structure

Figure 3 shows the histogram plot for Structure of the micro robot system and structure from the figure it is clearly seen that the data are slightly Left skewed due to more respondent chosen 1 for Structure of the micro robot system and structure except the 2 value all other values are under the normal curve shows model is significantly following normal distribution.

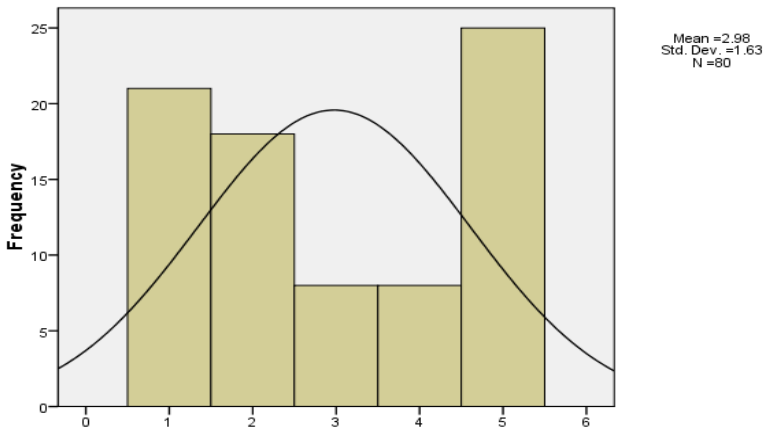

FIGURE 4. structure of AVR control system

Figure 4 shows the histogram plot for structure of AVR control system from the figure it is clearly seen that the data are slightly Left skewed due to more respondent chosen 3 for structure of AVR control system except the 2 value all other values are under the normal curve shows model is significantly following normal distribution.

TABLE 5. Correlations

	Control signal of micro robot turning around	Fish-like underwater micro robot moving forward	Structure of the micro robot system	structure of AVR control system
Control signal of micro robot turning around	1	.331**	.545**	.459**
Fish-like underwater micro robot moving forward	.331**	1	.701**	.719**
Structure of the micro robot system	.545**	.701**	1	.881**
structure of AVR control system	.459**	.719**	.881**	1
**. Correlation is significant at the 0.01 level (2-tailed).				

Table 5 shows the correlation between motivation parameters for Control signal of micro robot turning around. For Structure of the micro robot system is having highest correlation with Fish-like underwater micro robot moving forward and having lowest correlation. Next the correlation between motivation parameters for Fish-like underwater micro robot moving forward. For structure of AVR control system is having highest correlation with Control signal of micro robot turning around and having lowest correlation. Next the correlation between motivation parameters for Structure of the micro robot system. For structure of AVR control system is having highest correlation with Control signal of micro robot turning around and having lowest correlation. Next the correlation between motivation parameters for structure of AVR control system. For Structure of the micro robot system is having highest correlation with Control signal of micro robot turning around and having lowest correlation.

4. CONCLUSION

Ocean research requires the use of underwater robots, such as controlled boats (ROVs) and autonomously underwater vehicles (AUVs). These robots can investigate oceanic regions that are too hazardous or challenging for people to visit. Ocean research requires the use of mechanical diggers, including vehicles (AUVs) and remotely piloted submersible vehicles (ROVs) (AUVs). These machines can investigate oceanic regions that are too hazardous or challenging for people to visit. Underwater robotics is not only used in rescue and search, it is already used in marine resource exploration, undersea terrain mapping and construction and maintenance of marine engineering structures. The underwater robot can successfully detect all ships entering a port and ensure that drug dealers are not attaching any packages to the underwater sections. Movement control of a system for underwater micro robots by developing a PSO path planning optimization system and a VR Control system for three-dimensional space. Artificial intelligence, network technology, and underwater medicine can all benefit from using this kind of submerged micro robot system. an array of micro robotics for drugs. Every A micro robot with smart materials can be used for transportation Some drug injection task and micro robot The most difficult underwater activities, such context identification and analysis, may be finished by the system. The underwater tiny robot system can be utilized for artificial intelligence, multi-micro robot medicines system management, and underwater medical knowledge networks. Each micro-smart robot's material can be utilized to carry out a specific medication injection operation, and the nanometer system can carry out more difficult underwater activities including environmental analysis and detection. First, we create the framework for a VR controller and a micro robot system. To find the shortest path in one robot and three robots, a novel circular particle path search approach is used to look for particles mostly on path to avoid the obstruction. Control system The Powerful Processor that directs the robot's operations. Sensors: A part that supplies electrical signals so that a robot can communicate with its environment. Actuators: The robot's motorized components that move it. Peripheral Interface Controllers, sometimes known as PICs, are a kind of microcontroller parts used in the creation of electrical, robotic, and similar devices. It has a silicone tail and a 3D printed body, making reproduction simple and economical. It is fueled by a lithium battery. So Fi, a fish-like creature measuring 17 cm long (18.5 inches), glides through the water with ease. The artificial fish can swim at a speed of half its length per second. The best swimming robotic pets in real life, the new ZURU Robot Fish, measure 8 cm in seconds. Links and joints make up the basic framework of industrial robots, which is mostly made up of robot arms. The elbow and shoulder joints, as well as the bones that link those joints, are the counterpart of a robot's joints in relation to a human body. Even when the public input voltage, period, or system load varies significantly, the automated voltage

regulator's (AVR) objective is to preserve a constant voltage and power line heating or cooling to the equipment load under a range of circumstances. SPSS statistics is a multivariate analytics, business intelligence, and criminal investigation data management, advanced analytics, developed by IBM for a statistical software package. A long time, spa inc. Was created by, IBM purchased it in 2009. The most contemporary versions are marketed under the designation IBM SPSS statistics. Control signal of micro robot turning around, Fish-like underwater micro robot moving forward, Structure of the micro robot system and structure of AVR control system. The Cronbach's Alpha Reliability result. The overall Cronbach's Alpha value for the model is .860which indicates 86% reliability. From the literature review, the above 50% Cronbach's Alpha value model can be considered for analysis

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