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HASIL PENILAIAN SEJAWAT SEBIDANG ATAU *PEER REVIEW*
KARYA ILMIAH : JURNAL ILMIAH

Judul Jurnal Ilmiah (Artikel)	:	Application of Wearable Control Based on Feedforward Neural Network to Control Manipulator Arm of Field and Service Robot		
JumlahPenulis	:	3 orang (**Joga Dharma Setiawan**, Archit Fadhilah, Munadi)		
Status Pengusul	:	Penulis ke-1		
Identitas Jurnal Ilmiah	:	a. Nama Jurnal	:	International Journal of Innovations in Engineering and Technology (IJIET)
		b. Nomor ISSN	:	2319-1058
		c. Vol, No., BlnThn	:	Volume 18 Issue 1 – December 2020
		d. Penerbit	:	International Journal of Innovations in Engineering and Technology
		e. DOI artikel (jikaada)	:	http://dx.doi.org/10.21172/ijiet.181.01
		f. Alamat web jurnal	:	https://ijiet.com/issues/volume-18-issue-1-december-2020/
		Alamat Artikel	:	https://ijiet.com/wp-content/uploads/2020/12/1.pdf
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Semarang, 1 Juli 2021

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2. **<u>Ruang lingkup dan kedalaman pembahasan:</u>**
   Artikel ini melakukan pengembangan exoskeleton robot lunak yang bisa dipakai untuk membuat kendali lengan robot menjadi lebih mudah dan ergonomis. Feedforward Nerual network diterapkan untuk mengendalikan gerakan lengan robot. Metode dan hasil penelitian telah disajikan dengan lengkap dan detail disertai dengan gambar yang menarik.
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Reviewer 1

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2. **Ruang lingkup dan kedalaman pembahasan:**
   Penelitian yang dibahas dalam artikel ini berisi tentang pengembangan kendali lengan robot berbasis neural network dengan input sinyal sensor yang dapat digunakan operator secara ergonomis. Pengembangan sistem kendali ini diuji secara virtual menggunakan 3D animation toolbox dalam software MATLAB
3. **Kecukupan dan kemutakhiran data/informasi dan metodologi:**
   Metode yang diusulkan oleh penulis yaitu dengan mengendalikan lengan robot berbasis data-driven approach menggunakan neural network merupakan ide yang orisinil dan mutakhir dalam bidang penelitian wearable robot.. Similarity score dalam Turnitin cukup rendah yaitu 9%.
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   Kualitas dan kelengkapan unsur dari artikel sudah cukup baik jika dilihat dari susunan jurnal dan telah terindeks di DOAJ, Google Scholar dan lain-lain.

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Reviewer 2

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Volume 18 Issue 1 – December 2020

1.	**Application of Wearable Control Based on Feed-forward Neural Network to Control Manipulator Arm of Field and Service Robot** Joga Dharma Setiawan, Archit Fadhilah, Dr. Eng. Munadi	(https://ijiet.com/wp-content/uploads/2020/12/1. Image Not Found pdf)
2.	**Aqueous Chemical Method Synthesis of Hexagonal Nanostructured ZnO: Effect of Ag Doping on Ethanol Vapor Response Property** A.V. Rajgure	(https://ijiet.com/wp-content/uploads/2020/12/2. Image Not Found pdf)
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Application of Wearable Control Based on Feedforward Neural Network to Control Manipulator Arm of Field and Service Robot

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Abstract- Manipulator arm control in Field and Service Robot (FSR) which uses joystick as inputs is not easy and less efficient. Special training, and long study time for operators to be able to control precisely and quickly are needed. In this study, a wearable control device was used to replace joystick based on wearable control using Artificial Neural Network (ANN). The wearable control used is Myo Armband worn on the operator's right arm. This sensor consists of an electromyography sensor (EMG), 3-axis accelerometer, and 3-axis gyroscope. When the operator moves its arm, the operator's arm and arm position will be the command to move the 3D Manipulator Arm in MATLAB/Simulink. The operator's arm and arm position are read using the Inertial Measurement Unit (IMU) sensor found in the Myo Armband. Data acquisition from IMU is processed using ANN using the Feedforward Neural Network (FNN) method. The output of the user/operator arm angle of the FNN is used to drive the 3D Manipulator Arm model in the SimMechanics. Based on the result the FNN regression can be used successfully to drive the 3D animation of the manipulator's arm in real-time. With an accuracy value of R from training, validation, and testing 0.973, 0.967, and 0.982 respectively, and the overall R is 0.973 meaning the ANN works very well because all numbers exceed 0.950.

Keywords: wearable control, Myo Armband, artificial neural network, manipulator's arm.

I. INTRODUCTION

A field and service robot (FSR) is a robot created to help humans work both inside and outside the room. FSR replaces human position in a less secure condition or work area. FSR can be controlled remotely using wireless control [1]. FSR is usually equipped with a manipulator's arm to carry out its functions. This manipulator's arm is controlled using a joystick so that it is difficult and less efficient when controlled by the operator [2]. Operators need special training and a long time to become proficient at handling manipulator arms. In this research, wearable control is used to replace the joystick. Wearable control is expected to be easier and more efficient when used by operators. A wearable control device is worn on an operator's body, for example on the hands, arms, legs, thighs, head, and other limbs. The wearable control used in this research is the Myo Armband [3]. Myo Armband is worn on the operator's right arm. Myo Armband consists of sensors electromyography (EMG), inertial measurement unit (IMU). Research using the Myo Armband has been carried out to estimate arm movements [4]. The Myo Armband is often used by the EMG for control devices [5]. The use of EMG as a controller is one of them applied to manipulators [5][6]. The neural network has been implemented into the previous control system [7][8]. The system in this research will be carried out in MATLAB simulation as in [9]. Real-time system testing is used in simulations [10]. In this study, when the operator/user moves his/her arm, the movement and rotation angle of his arm becomes the command for the manipulator's arm. The manipulator's arm is modeled in 3D in MATLAB Simscape. The movement and position of the operator's arm are read by the IMU sensor on the Myo Armband. The signal from IMU is forwarded and processed using artificial neural network (ANN) regression with the feedforward neural network (FNN) method. The output of the FNN is used to control the 3D manipulator arm model in MATLAB/Simulink environment.

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Aqueous Chemical Method Synthesis of Hexagonal Nanostructured ZnO: Effect of Ag Doping on Ethanol Vapor Response Property

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Abstract - Undoped and Ag doped ZnO thin films with various Ag doping concentrations (1 to 3 at.%) were prepared by aqueous chemical method. The structural and gas sensing properties of the films were carried out. XRD patterns show hexagonal structure of the ZnO with reduced in (002) intensities after Ag doping. The 2 at % Ag doped ZnO sample shows highest gas response towards 100 ppm ethanol at low operating temperature with fast response of 8s and recovery time of 23 s as compared with undoped ZnO thin film. The results demonstrated that Ag doped ZnO sensor could be a good choice for ethanol gas sensing.

Keywords: Ag doped zinc oxide; Gas sensor; aqueous chemical route;

I. INTRODUCTION

Zinc oxide (ZnO) is an interesting *n*-type semiconductor which is chemically and thermally stable and having wurtzite structure with large-band gap energy of 3.37 eV. The gas sensors based on ZnO have been fabricated by various techniques, such as chemical vapour deposition [1], thermal evaporation [2], spray pyrolysis [3], hydrothermal method [4], etc. Among them the aqueous chemical method is a unique technique which offers a relatively facile and versatile method for the large-scale synthesis of nanostructures that are exceptionally long in length, uniform in diameter, large in surface area; especially diversify in composition [5]. The solution-based aqueous chemical method offers a simple and low cost route for large area thin film coating method and proved as an alternative to high temperature thermal deposition techniques [6]. Moreover, it has the advantage of fabricating thin films with a small grain size and a large surface area, useful for gas sensing applications. However, the response of ZnO based materials, especially to some chemically reduced gases, such as ethanol, acetone, etc. is observed at high working temperature of 400–500ºC. Therefore, there is an obligatory need of making effort to improve their gas sensing property at low temperature. Of the available solutions, doping is an important and effective way to improve the properties of semiconductor gas sensors. The dopant acts as a catalyst, produces structural change, which enhances the gas sensing properties [7-8]. The gas sensing properties are related to some critical factors, such as the surface state, morphology, surface to volume ratio and active centers of the material.

In this study, undoped ZnO and Ag doped ZnO thin films with various Ag concentrations were synthesized using an aqueous chemical method. The effect of Ag doping on the structural and the ethanol sensing properties of ZnO thin films is investigated.

II. EXPERIMENTAL DETAILS

2.1. Synthesis method

The undoped and Ag doped ZnO thin films were deposited using the aqueous chemical method. Prior to dipping into the seed solution the glass substrates were cleaned ultrasonically by a freshly prepared dilute hydrochloric acid, distilled water and further these substrates were dried at room temperature. The detailed procedure of formation of seed solution has been described earlier report [9]. The seeded substrate was further used to deposit the material in present study. The equimolar solution was prepared by using zinc acetate and Hexamethylenetetramine (HMTA) 0.025M (equal molar) powder and they were dissolved in a 160 ml of double distilled water. The precursor solutions were added with vigorous stirring for 30 min and it was refluxed at 95ºC for optimum time. The concentration of Ag was varied from 0 to 3 at.% with a step of 1 and accordingly the samples were denoted as S1, S2, S3, and S4 respectively.