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Judul Jurnal Ilmiah (Artikel) : Grasp posture control of wearable extra robotic fingers with flex sensors based on neural network

Jumlah Penulis : 6 orang (Joga D. Setiawan, M. Ariyanto, M. Munadi, M. Mutoha, A. Glowacs, W. Caesarendra)

Status Pengusul : Penulis ke-1 (Bukan Penulis Korespondensi)

Identitas Jurnal Ilmiah : a. Nama Jurnal : Electronics
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c. Vol, No., Bln Thn : Volume 9, Issue 6, Juni 2020
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e. DOI artikel (jika ada) : 10.3390/electronics9060905
f. Alamat web jurnal : <https://www.mdpi.com/journal/electronics>
Alamat Artikel : <https://www.mdpi.com/2079-9292/9/6/905>
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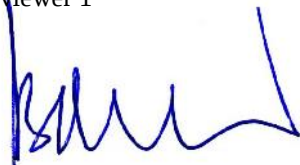
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Reviewer 2



Prof. Dr. Jamari, S.T., M.T.
NIP. 197403042000121001
Unit Kerja : Departemen Teknik Mesin FT UNDIP

Semarang, 1 Juni 2021
Reviewer 1



Prof. Dr. rer.nat. Ir. A.P. Bayuseno, M.Sc
NIP. 1962052201989021001
Unit Kerja : Departemen Teknik Mesin FT UNDIP

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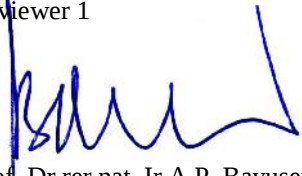
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2. **Ruang lingkup dan kedalaman pembahasan:**
Penelitian yang dibahas dalam artikel ini berisi tentang pengembangan *extra robotic fingers* yang dikendalikan berbasis *data-driven approach* menggunakan neural network. Hasil penelitian menunjukkan bahwa dengan menggunakan pendekatan *data-driven* berbasis neural network, *extra robotic fingers* dapat digunakan untuk membantu pekerjaan *object manipulation* dengan menggunakan satu tangan dibantu oleh *extra robotic fingers*. Hasil dan analisa dari penelitian telah disajikan dengan lengkap dan detail oleh penulis.

3. **Kecukupan dan kemutakhiran data/informasi dan metodologi:**
Metode yang diusulkan oleh penulis yaitu dengan mengendalikan *extra robotic fingers* berbasis *data-driven approach* menggunakan neural network merupakan ide yang orisinil dan mutakhir dalam bidang penelitian *wearable robot*. Saat ini belum banyak penelitian tentang *extra robotic fingers* untuk *bimanual object manipulation*. Similartiy score dalam Turnitin cukup rendah yaitu 8%.

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Semarang, 1 Juni 2021
Reviewer 1



Prof. Dr.rer.nat. Ir A.P. Bayuseno, M.Sc.
NIP. 196205201989021001
Unit kerja : Teknik Mesin FT UNDIP

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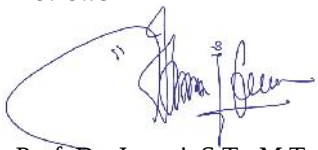
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2. **Ruang lingkup dan kedalaman pembahasan:**
Artikel ini meneliti tentang robot jari tambahan yang digunakan untuk membantu dalam menggenggam object yang membutuhkan dua tangan. Dengan adanya robot jari tambahan ini, pengguna dapat melakukan manipulasi objek menggunakan satu tangan yang jari-jari nya dipasang sensor *flex sensor* untuk mengendalikan gerakan robot tangan tersebut. Penulis menunjukkan bahwa *machine learning* berbasis neural network berhasil mengendalikan gerakan robot yang selaras dengan gerakan jari-jari pengguna.

3. **Kecukupan dan kemutakhiran data/informasi dan metodologi:**
Ide dan robot yang dikembangkan oleh penulis/pengusul merupakan ide yang kreatif dan orisinal. Masih sangat sedikit peneliti yang mengembangkan robot jari tambahan yang digunakan untuk manipulasi objek menggunakan metode kecerdasan buatan berbasis neural network. Metodologi dan hasil penelitian telah dibahas dengan detail dan lengkap dalam jurnal. Similiarity score dalam Turnitin yaitu 8%.

4. **Kelengkapan unsur dan kualitas terbitan:**
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Semarang, 1 Juni 2021
Reviewer 2



Prof. Dr. Jamari, S.T., M.T.
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Grasp posture control of wearable extra robotic fingers with flex sensors based on neural network

Setiawan J.D.^{a,b} ✉, Ariyanto M.^{a,b} ✉, Munadi M.^a ✉, Mutoha M.^a ✉, Glowacz A.^c ✉, Caesarendra W.^{a,d} ✉

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^a Department of Mechanical Engineering, Faculty of Engineering, Diponegoro University, Semarang, 50275, Indonesia

^b Center for Biomechanics, Biomaterials, Biomechantronics and Biosignal processing (CBIOM3S), Diponegoro University, Semarang, 50275, Indonesia

^c AGH University of Science and Technology, aleja Adama Mickiewicza 30, Kraków, 30-059, Poland

^d Faculty of Integrated Technologies, Universiti Brunei Darussalam, Jalan Tungku Link, Gadong, BE1410, Brunei Darussalam

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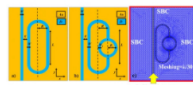
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Electronics 2021, 10(14), 1719; <https://doi.org/10.3390/electronics10141719> (registering DOI) - 17 Jul 2021

Abstract These days, with the emerging developments in wireless communication technologies, such as 5G and SD-WAN and the Internet of Things (IoT) sensors, the usage of E-Transport applications has been increasing progressively. These applications are E-Bus, E-Taxi, self-autonomous car, E-Train and E-Ambulance, and latency-sensitive [...] Read more.
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Electronics 2021, 10(14), 1718; <https://doi.org/10.3390/electronics10141718> (registering DOI) - 17 Jul 2021

Abstract This paper proposes an error-tolerant reconfigurable VDD (R-VDD) scaled SRAM architecture, which significantly reduces the read and hold power using the supply voltage scaling technique. The data-dependent low-power 10T (D²L10T) SRAM cell is used for the R-VDD scaled architecture with the [...] Read more.
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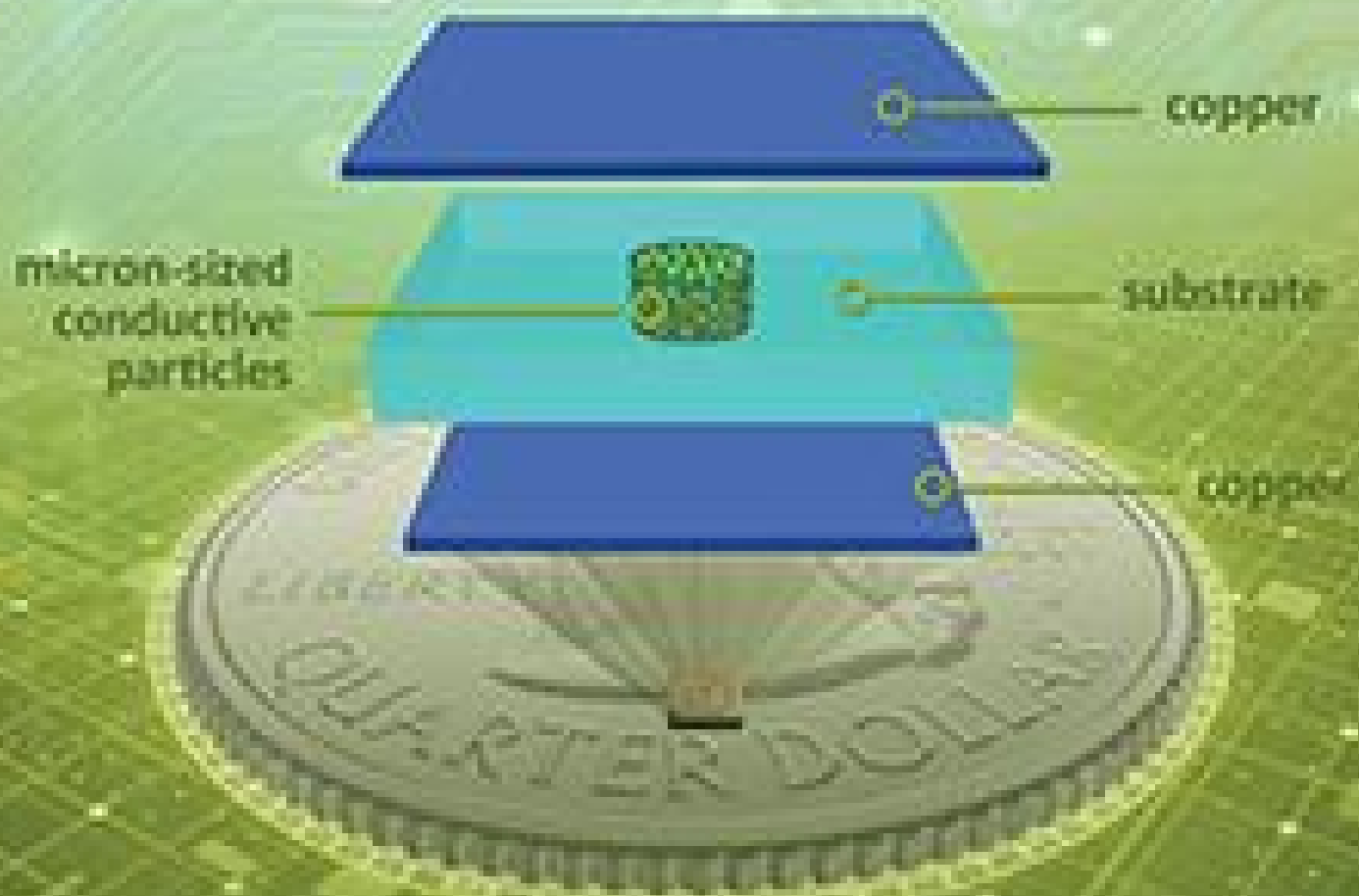
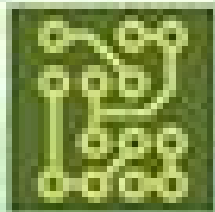
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Volume 9 • Issue 6 | June 2020

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Interests: renewable energy; rotating electrical machines; electricity storage technologies; smart grids; demand response; wind energy; power quality; power systems, artificial intelligence; photovoltaics; signal processing and control applications



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1. College of Computer and Information Sciences, Prince Sultan University, Riyadh 11586, **Saudi Arabia**

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Interests: control theory & applications; robotics; process control; artificial intelligence; machine learning

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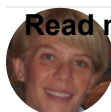
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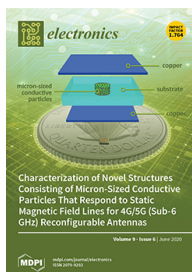
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Abstract Alzheimer's disease (AD) is an incurable pathology associated with progressive decline in memory and cognition. Phototherapy might be a new promising and alternative strategy for the effective treatment of AD, and has been actively discussed over two decades. However, the mechanisms of therapeutic [...] [Read more.](#)

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by Romeo Giuliano (<https://sciprofiles.com/profile/1100734>), Gian Carlo Cardarilli (<https://sciprofiles.com/profile/242202>),
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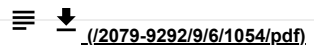
Abstract In the last few years, indoor localization has attracted researchers and commercial developers. Indeed, the availability of systems, techniques and algorithms for localization allows the improvement of existing communication applications and services by adding position information. Some examples can be found in the [...] [Read more.](#)

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Abstract In this paper, we evaluate end-to-end outage probability of a multi-hop decode-and-forward relaying protocol in underlay cognitive radio network. In the proposed protocol, named COOP, secondary nodes including source and relays have to harvest radio-frequency energy from multiple secondary power
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Grasp Posture Control of Wearable Extra Robotic Fingers with Flex Sensors Based on Neural Network (/2079-9292/9/6/905)

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Abstract This study proposes a data-driven control method of extra robotic fingers to assist a user in bimanual object manipulation that requires two hands. The robotic system comprises two main parts, i.e., robotic thumb (RT) and robotic fingers (RF). The RT is attached next [...] **Read more.**
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Grasp Posture Control of Wearable Extra Robotic Fingers with Flex Sensors Based on Neural Network

Joga Dharma Setiawan^{1,2}, Mochammad Ariyanto^{1,2} , M. Munadi¹, Muhammad Mutoha¹, Adam Glowacz^{3,*}  and Wahyu Caesarendra^{1,4,*} 

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Abstract: This study proposes a data-driven control method of extra robotic fingers to assist a user in bimanual object manipulation that requires two hands. The robotic system comprises two main parts, i.e., robotic thumb (RT) and robotic fingers (RF). The RT is attached next to the user's thumb, while the RF is located next to the user's little finger. The grasp postures of the RT and RF are driven by bending angle inputs of flex sensors, attached to the thumb and other fingers of the user. A modified glove sensor is developed by attaching three flex sensors to the thumb, index, and middle fingers of a wearer. Various hand gestures are then mapped using a neural network. The input data of the robotic system are the bending angles of thumb and index, read by flex sensors, and the outputs are commanded servo angles for the RF and RT. The third flex sensor is attached to the middle finger to hold the extra robotic finger's posture. Two force-sensitive resistors (FSRs) are attached to the RF and RT for the haptic feedback when the robot is worn to take and grasp a fragile object, such as an egg. The trained neural network is embedded into the wearable extra robotic fingers to control the robotic motion and assist the human fingers in bimanual object manipulation tasks. The developed extra fingers are tested for their capacity to assist the human fingers and perform 10 different bimanual tasks, such as holding a large object, lifting and operate an eight-inch tablet, and lifting a bottle, and opening a bottle cap at the same time.

Keywords: data-driven control method; extra robotic fingers; flex sensor; force-sensitive resistor; neural network; bimanual manipulation

1. Introduction

The use of robotic arms is typically common in manufacturing and service operations [1,2]. The current research is more focused on robots that can be worn due to the growing demand for them. The most widely known of these types of robots are prosthesis and exoskeleton robots. A prosthesis is used to replace the lost limbs of humans due to accidents or birth defects. Many researchers around the world have developed myoelectric prosthetic hands to replace and add upper limbs, [3–11], and ankle/foot prosthesis for the lower limb [12–14]. Several researchers have attempted to make the cost of the prosthetic hand more affordable, by utilizing 3D printer technologies [3–5] and tendon mechanisms [6]. The researchers in Italy strive to replicate the human hand as closely as possible,

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Photostimulation of Extravasation of Beta-Amyloid through the Model of Blood-Brain Barrier

Ekaterina Zinchenko ^{1,*}, Maria Klimova ¹, Aysel Mamedova ¹, Ilana Agranovich ¹, Inna Blokhina ¹, Tatiana Antonova ¹, Andrey Terskov ¹, Alexander Shirokov ^{1,2}, Nikita Navolokin ^{1,3}, Andrey Morgun ⁴, Elena Osipova ⁴, Elizaveta Boytsova ⁴, Tingting Yu ^{5,6}, Dan Zhu ^{5,6}, Juergen Kurths ^{1,7,8} and Oxana Semyachkina-Glushkovskaya ^{1,7,*}

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Abstract: Alzheimer's disease (AD) is an incurable pathology associated with progressive decline in memory and cognition. Phototherapy might be a new promising and alternative strategy for the effective treatment of AD, and has been actively discussed over two decades. However, the mechanisms of therapeutic photostimulation (PS) effects on subjects with AD remain poorly understood. The goal of this study was to determine the mechanisms of therapeutic PS effects in beta-amyloid (A β)-injected mice. The neurological severity score and the new object recognition tests demonstrate that PS 9 J/cm² attenuates the memory and neurological deficit in mice with AD. The immunohistochemical assay revealed a decrease in the level of A β in the brain and an increase of A β in the deep cervical lymph nodes obtained from mice with AD after PS. Using the in vitro model of the blood-brain barrier (BBB), we show a PS-mediated decrease in transendothelial resistance and in the expression of tight junction proteins as well as an increase in the BBB permeability to A β . These findings suggest that a PS-mediated BBB opening and the activation of the lymphatic clearance of A β from the brain might be a crucial mechanism underlying therapeutic effects of PS in mice with AD. These pioneering data open new strategies in the development of non-pharmacological methods for therapy of AD and contribute to a better understanding of the PS effects on the central nervous system.

Keywords: Alzheimer's disease; transcranial photostimulation; lymphatic system; blood-brain barrier

Indoor Localization System Based on Bluetooth Low Energy for Museum Applications

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Abstract: In the last few years, indoor localization has attracted researchers and commercial developers. Indeed, the availability of systems, techniques and algorithms for localization allows the improvement of existing communication applications and services by adding position information. Some examples can be found in the managing of people and/or robots for internal logistics in very large warehouses (e.g., Amazon warehouses, etc.). In this paper, we study and develop a system allowing the accurate indoor localization of people visiting a museum or any other cultural institution. We assume visitors are equipped with a Bluetooth Low Energy (BLE) device (commonly found in modern smartphones or in a small chipset), periodically transmitting packets, which are received by geolocalized BLE receivers inside the museum area. Collected packets are provided to the locator server to estimate the positions of the visitors inside the museum. The position estimation is based on a feed-forward neural network trained by a measurement campaign in the considered environment and on a non-linear least square algorithm. We also provide a strategy for deploying the BLE receivers in a given area. The performance results obtained from measurements show an achievable position estimate accuracy below 1 m.

Keywords: bluetooth low energy; indoor localization system; received signal strength indicator; neural network

1. Introduction

Accurate estimation and tracking of the positions of people, objects or animals enables the provisioning of several advanced services such as the automatic execution of task(s) triggered by events consisting for example of a person passing a specific position in the area, commercial or recreational applications requiring location information inside a specific area, etc. [1]. In the last few years, the possibility of realizing advanced communication applications and services supported by position information have favored and encouraged the development of systems for the indoor localization of people and objects. In parallel, the evolution of these systems has been constantly supported by the technological advancements of internet of things (IoT) [2] technologies specifically conceived for low-cost short-range radio transmission such as Bluetooth [3] and its variants and radio frequency identification (RFID) technologies [4].

The design of localization systems based on short range radio technologies is not a trivial task. In fact, radio signal propagation inside buildings is influenced by several factors, such as construction

Outage Performance of Power Beacon-Aided Multi-Hop Cooperative Cognitive Radio Protocol Under Constraint of Interference and Hardware Noises

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Abstract: In this paper, we evaluate end-to-end outage probability of a multi-hop decode-and-forward relaying protocol in underlay cognitive radio network. In the proposed protocol, named COOP, secondary nodes including source and relays have to harvest radio-frequency energy from multiple secondary power beacons, and adjust their transmit power, follows a pre-determined interference threshold given by multiple primary users. To enhance the outage performance for the secondary network under an joint constraint of the interference threshold, Rayleigh fading channel and hardware noises caused by imperfect transceiver hardware, the secondary relays on the source-destination path cooperate to forward the source data to the destination. Particularly, they attempt to receive the source data from their previous nodes, and forward it to the secondary destination if requested. Moreover, whenever the destination cannot receive the source data successfully, a successful relay that has the shortest distance to the destination is selected for retransmission. Due to usage of the cooperative transmission, the proposed COOP protocol obtains better performance, as compared with the corresponding multi-hop relaying one (denoted DIRECT) which only uses direct transmission at each hop. We evaluate the outage performance of COOP and DIRECT via both simulation and theory. The obtained results present a significant performance enhancement, as comparing COOP with DIRECT.

Keywords: radio-frequency energy harvesting; cooperative multi-hop transmission; underlay cognitive radio; outage probability

1. Introduction

Radio frequency energy harvesting (RF-EH) [1–5] is a new and promising technique for wireless communication applications in future when the number of wireless devices exponentially increases. In addition, RF-EH also allows a transmitter to simultaneously send energy and information to its intended receivers via wireless signals. As proposed in Reference [6], a relay node can receive both data and energy from a source by allocating a fraction of the received signal power for EH, and remaining one for data transmission. This method is named as power-splitting (PS) RF-EH, and is widely applied