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2020 the third International Conference on Vocational Education and Electrical Engineering (ICVEE)

Strengthening the framework of Society 5.0 through Innovations in Education, Electrical, Engineering and Informatics Engineering

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2020 the third International Conference on Vocational Education and Electrical Engineering (ICVEE)

Proceeding

2020 the third International Conference on Vocational Education and Elecrical Engineering (ICVEE) on October 3-4, 2020 in the virtual event, Surabaya, Indonesia.

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Message from the General Chair

It gives me great pleasure to all of the keynote/invite speakers, distinguished guests, and ICVEE participants, welcome to 2020 the third International Conference on Vocational Education and Electrical Engineering (ICVEE). Due to the COVID-19 ICVEE conference which is organized by the Department of Electrical Engineering and Departement of Informatics, Universitas Negeri Surabaya and technical sponsorship IEEE Indonesia section hold the conference in the virtual event. The theme of our conference is " Strengthening the framework of Society 5.0 through Innovations in Education, Electrical Engineering, and Informatics Engineering".

This year we receive 134 articles and resulted in 71 articles that have been presented at this conference and will be submitted to the IEEE explorer. The article comes from some domestics and international universities. The International author and co-author come from Brazil, Jerman, Philippines, Japan, Taiwan, Singapore, Malaysia, Thailand, Saudi Arabia, and Australia. We would like to appreciate all of the keynotes and invite speakers, reviewers, committees, and participants for all the support and participation. We would like to give gratitude to the Universitas Negeri Surabaya as the organizer and IEEE Indonesian Section as a technical Co-sponsorship.

Finally, I wish all participants always successful and enjoy this conference. I hope this program will be interesting and useful for all the ICVEE participants.

Prof. Dr. Bambang Suprianto., MT

General Chair

Organizer and committee

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General and Paralel Program Schedule

General Timetable ICVEE
Saturday, October 3-4, 2020

No	Activity	Time	Duration	PIC	Necessity
Plenary Session Sat, Oct 3					
1	Online Registration (Technical meeting Preparation and On the Spot registration)	07.30 – 08.00	30 minutes	Committee	**Laptop, internet**
2	Opening and Rules Guidance for the Virtual Conference	08.00 – 08.10	10 minutes	Committee	**Laptop, file, documentatio**
3	Viewing Profile Video of Universitas Negeri Surabaya, Listening Indonesia National Anthem, and Listening Mars of Universitas Negeri Surabaya	08.10 – 08.30	20 minutes	Committee	**Laptop, file, documentatio**
4	Welcoming Session	08.30 – 08.50	20 minutes	**Prof. Dr. Bambang Yulianto**., **M.Pd** Vice Rector I of Universitas Negeri Surabaya	**Laptop, file**
5	Keynote Speaker 1 (ICVEE)	09.00 – 09.30	30 minutes	**Prof. Takeshi Fukusako,** Professor at Kumamoto University, Japan	**Laptop, file**
6	Keynote Speaker 2	09.30 – 10.00	30 minutes	**Prof. Dr. Hadi Susanto**, Professor at University of Essex, UK and Khalifa University, UAE	**Laptop, file**
7	Keynote Speaker 3	10.00 – 10.30	30 minutes	**Prof. Johan Pion**, Professor at HAN University	
8	Live Discussion (Question and Answer)	10.30 – 11.15	45 minutes	Plenary Moderator	
Roundtable Discussion, Sat Oct 3, 2020 (ICVEE)					

No	Activity	Time	Duration	PIC	Necessity
9	Welcoming session from ICVEE chair	12.00-12.10	10 minutes	**Prof Bambang Suprianto., MT**	**Laptop, file**
10	Invited Speaker I	12.10 – 12.35	25 minutes	**Prof. Madya. Ir. Dr. Abd Kadir bin Mahamad** **Universiti Tun Hussein Onn Malaysia (UTHM) (Malaysia)**	**Laptop, file**
11	Invited Speaker II	12.35 – 13.00	25 minutes	**Prof. Mingchang Wu., Ph.D.** **National Yunlin University of Science and Technology (Taiwan)**	**Laptop, file**
11	Invited Speaker III	13.00 – 13.30	30 minutes	**Prof. Wisnu Jatmiko., Ph.D** **Universitas Indonesia (UI)** **(IEEE Indonesian Section chair)**	**Laptop, file**
10	Live Discussion (Question and Answer)	13.30 – 14.15	45 minutes	Plenary Moderator	
13	Rules Guidance for the Roundtable Discussion	14.15 – 14.30	15 minutes	Committee (IEEE-AP) (IEEE for room 1-8)	**Laptop, file**
14	Session of Roundtable Discussion	14.30 – 17.00		Room 1 – Room 8 (14.30-14.45) Room 1 – Room 8 (14.45-15.00) Room 1 – Room 8 (15.00-15.15) Room 1 – Room 8 (15.15-15.30) **Break (30 minutes)** Room 1 – Room 8 (16.00-16.15) Room 1 – Room 8 (16.15-16.30) Room 1 – Room 8 (16.30-16.45) Room 1 – Room 8 (16.45-17.00) Room 1 – Room 8 (17.00-17.15) Room 1 – Room 8 (17.15-17.30)	**Laptop, file**

No	Activity	Time	Duration	PIC	Necessity
				Break (30 minutes)	
15	Announcement best paper/presenter and reviewer Closing speech	18.00 – 18.30	30 minutes	Room 1	Laptop, internet

PARALLEL SESSION TIMETABLE ICVEE

Saturday, October 3, 2020

Room 1

Moderator 1 IGP Asto Buditjahjanto

2 Lilik Anifah

No	Paper ID	Paper Title	Time (GMT +7)
1	266	Differences Between Students from Senior High School and Vocational School in the Learning Outcomes of Electrical Engineering Students	14.30-14.45
2	270	absent	
3	276	Combining the Unsupervised Discretization Method and the Statistical Machine Learning for the Modeling of the Students' Performance	15.00-15.15
4	294	The effect of changing the type of lamp, lighting power and adding light points to the strength of the lighting in the Classroom and Reading Room of the Postgraduate Program at the Bung Hatta Building, Jakarta State University	15.15-15.30
	BREAK		14.45-15.15
5	352	absent	16.00-16.15
6	362	absent	16.15-16.30
7	363	Google Classroom Effectiveness and Efficiency as Alternative Online Learning Media to Overcome Physical Distancing in Lectures as a result of the Covid-19 pandemic: Student Perspectives	16.30-16.45
8	367	Effectiveness of Mobile Learning Implementation in Increasing Student Competence and Preventing the Spread and Impact of COVID-19	16.45-17.00
9	368	The Effect of Participation in Scientific Research and Conference on Vocational Teachers' Competencies	17.00-17.15
10	412	Evaluation of Indonesian Technical and Vocational Education in Addressing the Gap in Job Skills Required by Industry	17.15-17.30

Room 2

Moderator 1 Hapsari P A Tjahyaningtijas

2

No	Paper ID	Paper Title	Time (GMT +7)
1	413	Semantic Web Ontology for Vocational Education Self-Evaluation System	14.30-14.45
2	416	The impact of The COVID-19 Pandemic in Indonesia (Face to face versus Online Learning)	14.45-15.00
3	425	absent	15.00-15.15
4	459	DESIGN OF COMPETENCY TEST MODEL FOR ELECTRICAL INSTALLATION AUTOMATION BASED ON PROJECT LEARNING FOR ELECTRICAL ENGINEERING STUDENTS	15.15-15.30
	BREAK		14.45-15.15
5	474	EFFECTIVENESS THE USE OF INTERACTIVE MULTIMEDIA LEARNING MEDIA IN FACIAL SKIN CARE COURSES	16.00-16.15
6	476	The Effect of the Android based Mobile-Learning Models on Student Learning Outcomes in Research Methodology Courses in the Cosmetology and Beauty Department	16.15-16.30
7	489	The Marketing of Teaching Factory Product Through Online E-Commerce at Fashion Design Vocational High Schools	16.30-16.45
8	507	absent	16.45-17.00
9	330	FACTOR ANALYSIS THAT INFLUENCES CPL/PILOT LICENSE COMMERCIAL PHASE TECHNICAL KNOWLEDGE OF CADETS OF OFFICIAL AVIATION SCHOOL VOCATIONAL EDUCATION	17.00-17.15
10	347	Measurement Model of Employability Skills of Vocational High School Student in East Java Using Structural Equation Model (SEM)	17.15-17.30

Room 3

Moderator **1** **Naim Rochmawati**

2 **Yeni Anistyasari**

No	Paper ID	Paper Title	Time (GMT +7)
1	231	Learning Solutions for Multi Interaction-Based Computer Network Devices with Mobile Augmented Reality (Effectiveness, Interface, and Experience Design)	14.30-14.45
2	236	The Concept of Using TOLSYASUPI-EduMed in Basic Programming Learning with Problem-Posing Interaction Flow	14.45-15.00
3	238	E-Voting on Blockchain using Solidity Language	15.00-15.15
4	303	Risk Analysis of Cloud Computing in the Logistics Process	15.15-15.30
	BREAK		14.45-15.15
5	382	absent	16.00-16.15
6	433	Deep Learning Implementation of Facemask and Physical Distancing Detection with Alarm Systems	16.15-16.30
7	430	Covid Symptom Severity Using Decision Tree	16.30-16.45
8	462	An Enhanced Cryptographic Algorithm in Securing Healthcare Medical Records	16.45-17.00
9	538	Detecting SQL Injection On Web Application Using Deep Learning Techniques: A Systematic Literature Review	17.00-17.15
10	554	Integration of FAHP and COPRAS Method for New Student Admission Decision Making	17.15-17.30

Room 4

Moderator **1** **Salamun Rohman Nudin**

2 **Ricky Eka Putra**

No	Paper ID	Paper Title	Time (GMT +7)
1	568	Non-Proliferative Diabetic Retinopathy Classification Based on Hard Exudates Using Combination of FRCNN, Morphology, and ANFIS	14.30-14.45
2	406	A New Adaptive Online Learning using Computational Intelligence	14.45-15.00
3	420	The design and implementation of web crawler distributed news domain detection system	15.00-15.15
4	427	High Availability in Software-Defined Networking using Cluster Controller: A Simulation Approach	15.15-15.30
	BREAK		14.45-15.15
5	435	Pneumonia and COVID-19 Detection using Convolutional Neural Networks	16.00-16.15
6	354	What's in a Caption?: Leveraging Caption Pattern for Predicting the Popularity of Social Media Posts	16.15-16.30
7	372	Fractional Gradient Descent Optimizer for Linear Classifier Support Vector Machine	16.30-16.45
8	411	The Identification of the Apples (Malus Sylvestris) Skin Wax Coating Using the Edge Detection Method	16.45-17.00
9	453	Key Rate Enhancement by Using the Interval Approach in Symmetric Key Extraction Mechanism	17.00-17.15
10	484	EnORS: An Enhanced Object Relationship Schema	17.15-17.30
11	450	Development of Mapping Area Software for Dismissal people affected by Covid 19	17.3--17.45

Room 5

Moderator **1** **Reza Rahmadian**

2 **Rifqi Firmansyah**

No	Paper ID	Paper Title	Time (GMT +7)
1	298	Validation of Voice Recognition in Various Google Voice Languages using Voice Recognition Module V3 Based on Microcontroller	14.30-14.45
2	322	Texture Analysis of Knee Osteoarthritis Using Contrast Limited Adaptive Histogram Based Gray Level Co-occurrent Matrix	14.45-15.00
3	334	Design of Model Predictive Control for Stability of Two Stage Inverted Pendulum	15.00-15.15
4	358	Hydrothermal Growth Temperature Dependence of Nanostructured Nickel Oxide Transparency	15.15-15.30
	BREAK		14.45-15.15
5	359	Designing Automatic Dispensers for the Blind People based on Arduino Mega using DS18B20 Temperature Sensor	16.00-16.15
6	365	Effects of Precursor Concentration on the Transparency of Hydrothermally Grown Zinc Oxide	16.15-16.30
7	525	A Dual UPQC to Mitigate Sag/Swell, Interruption, and Harmonics on Three Phase Low Voltage Distribution System	16.30-16.45
8	370	Design and Implementation of IoT System for Aeroponic Chamber Temperature Monitoring	16.45-17.00
9	397	Autonomous Robotics in Agriculture: A Review	17.00-17.15
10	401	Design of Fire Detection Equipment Due to the Arc-Fault Series on Low Voltage Networks Based on Internet of Things (IoT)	17.15-17.30

Room 6

Moderator **1** **Arif Widodo**

2 **Unit Three K**

No	Paper ID	Paper Title	Time (GMT +7)
1	466	A Hybrid Classification Based on Machine Learning Classifiers to Predict Smart Indonesia Program	14.30-14.45
2	272	Optimization of Water Level Control Systems Using ANFIS and Fuzzy-PID Model	14.45-15.00
3	384	[Design And Development Of Student Absention Application Prototype Using Android-Based Flutter: A Case Study In Electro Engineering Department Of Mataram University	15.00-15.15
4	480	SIMULATION AND PERFORMANCE EVALUATION OF FIBER OPTIC SENSOR FOR DETECTION OF SALINITY IN PRAWN POND APPLICATION	15.15-15.30
	BREAK		14.45-15.15
5	488	MICROCONTROLLER AND WIRELESS COMMUNICATION BASED SMART LABORATORY BOX SYSTEM IMPLEMENTATION	16.00-16.15
6	491	Management of Empty Parking Spot Based On Computer Vision	16.15-16.30
7	369	Performance Evaluation of ESP8266 for Wireless Nurse Call System	16.30-16.45
8	374	A current mode ACG base on Sub-threshold MOS Translinear Principle	16.45-17.00
9	424	Combination of Fuzzy C-Means and Simple Additive Weighting Using Partition Coefficient Index	17.00-17.15
10	485	A Neuro-Fuzzy Approach for Cacao Bean Grading Classification Process	17.15-17.30

Room 7

Moderator **1** **Mahendra Widyartono**

2 **Widi Aribowo**

No	Paper ID	Paper Title	Time (GMT +7)
1	269	Tuning of Power System Stabilizer Using Cascade Forward Backpropagation	14.30-14.45
2	293	SETTING COORDINATION RELAY PROTECTION ON MULTYLOOP MODEL DISTRIBUTION ELECTRICAL POWER SYSTEM SISTEM USING FIREFLY ALGORITHM	14.45-15.00
3	300	HYBRID MODEL FOR THE NEXT HOURLY ELECTRICITY LOAD DEMAND FORECASTING BASED ON CLUSTERING AND WEATHER DATA	15.00-15.15
4	402	Partial Shading Effect on I-V Characteristic and Maximum Power of a Photovoltaic Array	15.15-15.30
	BREAK		14.45-15.15
5	428	Effect of Combination Fractional Slot Number and Slotting Tecnique on the Cogging Torque in Permanent Magnet Machines	16.00-16.15
6	267	absent	16.15-16.30
7	361	Research on the Influencing Factors of Industrial Designers' Potential Traits on Career Planning	16.30-16.45
8	442	DESIGN OF AERIAL ROBOT AS TEACHING MEDIA WITH EDUCATIONAL ROBOTIC BASED LEARNING SYSTEM	16.45-17.00
9	454	The Roles of Information Technology Knowledge and Online Learning in Learning Environment Changes at Vocational Education System	17.00-17.15
10			17.15-17.30

Room 8

Moderator **1** **Eppy Yundra**

2 **Nurhayati**

No	Paper ID	Paper Title	Time (GMT +7)
1	280	Motion Sensing for Wireless Body Area Networks Based on Android Using Wi-Fi Direct Transmission	14.30-14.45
2	316	Impact of Nonlinear Distortion with the Rapp Model on the GFDM System	14.45-15.00
3	319	The New Intelligent Wireless Sensor Network using Artificial Intelligence for Building Fire Disasters	15.00-15.15
4	327	A Vivaldi Antenna Palm Tree Class with Koch Square Fractal Slot Edge for Near-Field Microwave Biomedical Imaging Applications	15.15-15.30
	BREAK		14.45-15.15
5	336	Decision Support System Cattle Weight Prediction using Artificial Selected Weighting Method	16.00-16.15
6	349	Design of X-Band Microstrip Antenna for Circularly Polarized Synthetic Aperture Radar (CP-SAR) System	16.15-16.30
7	371	Design of Horizontal Polarization Microstrip Patch Antenna with Bandwidth Enhancement at C-band Frequency	16.30-16.45
8	376	Comparison Study of Hilbert Sierpinski and Koch Fractal on Coplanar Vivaldi Antenna for L and S band application	16.45-17.00
9	410	Design of a Microstrip Line Quad-band Bandpass Filter based on Fibonacci geometric sequence	17.00-17.15
10	461	Potentials of metasurface technology on antennas and propagation	17.15-17.30

Table of Contents

Motion Sensing for Wireless Body Area Networks Based on Android Using Wi-Fi Direct Transmission

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***Abstract*—Wireless sensor networks (WSN) applications were developed with a wide variety of applications. Wireless body area network (WBAN) was one of the implementations of WSN. The implementation used a sensor that was attached to the body to monitor body motion. In this article, we present our research about motion sensing for wireless body area networks (WBAN) that used Wi-Fi direct transmission. This article proposed a motion-sensing for wireless body area networks (MOSBAN) with Wi-Fi direct transmission based on android to send the value of accelerometer and gyroscope from smartphone to smartphone. MOSBAN is expected can send the value of sensors accurately with Wi-Fi direct transmission. This article presented a comprehensive result of 50 meters distance from smartphone1 to smartphone 2. The validity of MOSBAN is proven by exacted 100% of data transmission using Wi-Fi Direct.**

Keywords—Wireless sensor networks, MOSBAN, Accelerometer, Gyroscope.

I. INTRODUCTION

Wireless sensor networks (WSN) applications were developed with a wide variety of applications. Wireless body area network (WBAN) was one of the implementations of WSN. The implementation used a sensor that is attached to the body to monitor body motion. IEEE 802.15. 6 has provided international standards about the human body range to wireless communication for short-range, low power [1]. The recent year several efforts have increased for diversity application that can be supported by WBAN technology [2]. The development of wireless body area networks was triggered by multiple open issues. Performance that low-cost with also low power has been regulated by IEEE 802.15. [3]. Technology WBAN was very close to daily life, which was embedded on the smartphone. Many hand-held devices have sensors, even the user does not know about that. The accelerometer and gyroscope are one of the most included sensors.

The mobility of WBAN technology was supported by smartphone technology development. Even a smartphone can be used for data processing on the user's smartphone as well as give the signal alarm if there is a heart attack. The system was developed and controlled by smartphones based on android. To confirm the function of the system using three scenarios [4]. The custom-developed software must be installed on the PC to process the ECG and ACC data. The medical web server will be accepted all recorded information to store and display for doctors. To test the system, in this case using 10 healthy volunteers. Information on data was monitored as long as daily activities [5]. Therefore, the accelerometer sensor will be used alternatively for health monitoring in a more complex environment, [6-7]. However, all of the mentioned only partial sensor applications, still not combined yet each other. In [8], the authors presented a transmission power control (AA-TPC) use accelerometer assisted scheme which conducts the fluctuations of link qualities to reduce energy consumption. The system consideration relationship between body movement and link quality. Many researchers have chosen the Android platform for developing applications for many research purposes. However, feedback information is determined in transmission power. Another research [9] presented an analysis of the performance of IEEE 802.15.4 to improve performance networks. However, only for superframe duration, still not implemented yet for sensors networks. Investigation of WBAN's application has been proposed for motion detection and send data with Bluetooth transmission [10]. However, the result is still not validated yet between the transmitter and the receiver.

The system health-care promises that the continuous and reliable gathering and analysis of physiological and behavioral aspects of a patient, and delivers this information to physicians, which are the goal of body area networks (BANs). BANs can tackle health-care monitoring and delivery challenges by wireless technology and mobile and cloud computing through the use of independent sensors and actuators attached to the

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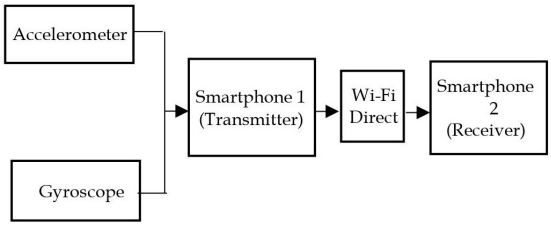

Fig. 1. The block diagram of scheme

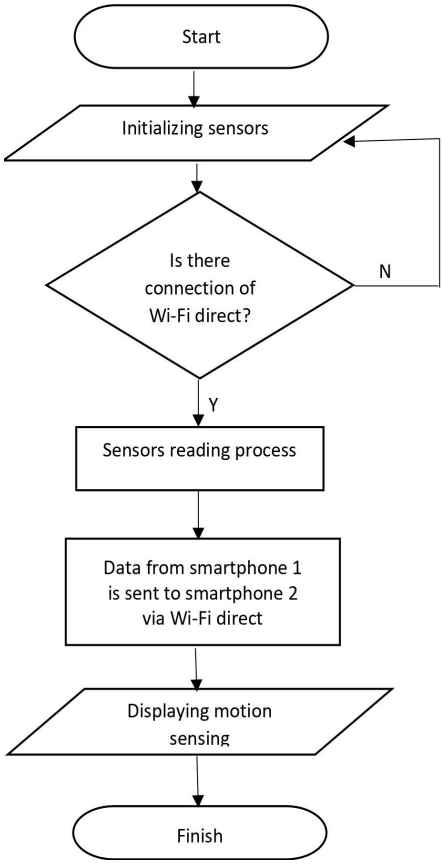

Fig. 2. Flowchart of MOSBAN

body. BANs can achieve what human–computer interaction aims for, i.e., the design of technologies that are flexible to human needs [11].

In [12], the authors evaluated the performance of the Wi-Fi Direct system using a testbed and compare it with the conventional Wi-Fi system for real-time data transfer. The system compared between Wi-Fi direct transmission and existing Wi-Fi system. However, only compare the data rate at a distance of 3.5 meters. The authors of [13] have demonstrated Wi-Fi direct transmission on D2D communications in a dense wireless network. The devices are tablets and smartphones can be used by Wi-Fi direct. The scheduling method is used to improve network performance and simulation methods for the validating system. However, to validate real devices still not conducted yet in the article. In [14], the authors have investigated Wi-Fi Direct on a reliable multicast problem. The method was a new algorithm called ELBM. The system tried to overcome collisions from AP and other stations. The system can increase throughput for ELBM algorithm compare with others. However, still, only the simulation method, while the implemented sensor on devices is not performed yet. The Wi-Fi direct based MSNP platform, and have addressed about discoverability and privacy and implemented a Wi-Fi direct networking module, and several typical applications in android have been proposed [15]. Multi-hop mobile and ad hoc network that is developed Wi-Fi direct for the group with specifically routing layer have been proposed by [16]. However, all of the above-mentioned talk about simulation methods and application on android devices only group communication.

This article proposed a motion-sensing for wireless body area networks (MOSBAN) with Wi-Fi direct transmission based on android to send values of accelerometer and gyroscope sensors from smartphone 1 to smartphone 2. MOSBAN was expected can send the value of sensors accurately with Wi-Fi direct transmission. The contribution of this method is the sensors can send the value of motion sensing from smartphone to smartphone via Wi-Fi direct transmission in display and graph form on distance 50 meters

II. THE DESCRIPTION OF MOSBAN

MOSBAN consists of several parts, namely the transmitter where the accelerometer and Gyroscope sensors are located, Wi-Fi direct, and the receiver. The accelerometer and Gyroscope sensors are located on the first smartphone will be attached to the human arm and function as a transmitter. The accelerometer is a sensor to measure an acceleration of gravity while a Gyroscope is a sensor that utilizes the principle of angular momentum that can maintain its orientation position based on the condition of the position of an object. The second smartphone will conduct as a receiver that receives sensor measurement values from the transmitter and displays them in graphical form. Wi-Fi direct as a transmission media between transmitter and receiver with a distance of 50 meters. The resulting graph is the movement that is censored by the accelerometer and the gyroscope sensors that are attached to the human arm.

III. THE METHOD OF MOSBAN

MOSBAN is a scheme that performs motion sensing using the accelerometer and gyroscope sensors that are founded on the smartphone. Then as a transmission medium using Wi-Fi direct and as a receiver also uses a smartphone. The block diagram can be shown in figure 1.

The algorithm of MOSBAN can be explained as follows: first, starting with an initializing accelerometer and gyroscope as data input connect with smartphone 1. Second, the MOSBAN has to check the connection with Wi-Fi direct. If there is no connection, the MOSBAN has to back to the first step and otherwise go to the next step. Third, the MOSBAN will perform to read the process of accelerometer and gyroscope sensors, Fourth, the data from smartphone 1 is sent to smartphone 2 via Wi-Fi direct. Finally, the MOSBAN will display of motion sensing on the smartphone as a receiver. Results

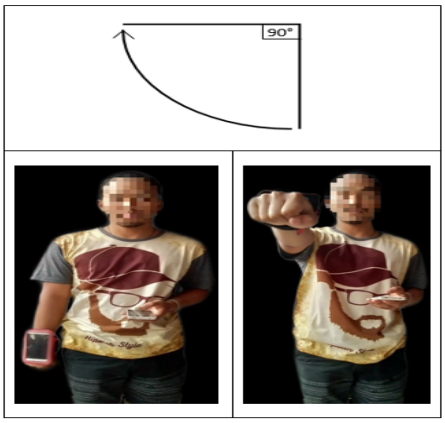

Fig. 3. Forward arm motion

Fig. 4. Screenshots display of forward arm motion (a) Transmitter (b) Receiver

The results of the MOSBAN test were taken in 2 arm motions, namely movements with an angle of 90 degrees and 180 degrees. The testing has distance 50 meters between the transmitter and receiver and there is no obstacle to the outdoor environment. The results of the data have taken 6 times in the same environment. In figure 3 shows a picture of forwarding arm motion, this movement starts from the ready position then moves the hand forward until straight ahead which forms an angle of 90 degrees.

Figure 4 shows the results of the comparison between transmitter and receiver. For figure 4 (a) is a screen capture image on the transmitter from forwarding arm motion, while figure 4 (b) is a screen capture image on a forward arm motion receiver

TABLE 1. CONFORMANCE LEVEL OF ACCELEROMETER DATA TRANSMISSION FROM FORWARDING ARM MOTION

Item	A0x1	A0x2	%	A0y1	A0y2	%	A0z1	A0z2	%
1	1.09	1.09	100%	4.56	4.56	100%	10.75	10.75	100%
2	1.70	1.70	100%	7.59	7.59	100%	18.90	18.90	100%
3	0.23	0.23	100%	11.34	11.34	100%	9.24	9.24	100%
4	-0.84	-0.84	100%	-2.14	-2.14	100%	1.35	1.35	100%
5	-2.86	-2.86	100%	-7.14	-7.14	100%	5.56	5.56	100%
6	-2.84	-2.84	100%	-7.17	-7.17	100%	6.25	6.25	100%

TABLE 2. CONFORMANCE LEVEL OF GYROSCOPE DATA TRANSMISSION FROM FORWARDING ARM MOTION

Item	G0x1	G0x2	%	G0y1	G0y2	%	G0z1	G0z2	%
1	0.97	0.97	100%	0.20	0.20	100%	0.04	0.04	100%
2	-2.06	-2.06	100%	0.91	0.91	100%	0.64	0.64	100%
3	-4.86	-4.86	100%	1.25	1.25	100%	-0.22	-0.22	100%
4	-0.31	-0.31	100%	1.57	1.57	100%	-5.67	-5.67	100%
5	1.90	1.90	100%	2.83	2.83	100%	-2.56	-2.56	100%
6	-8.03	-8.03	100%	-0.29	-0.29	100%	0.21	0.21	100%

side. Both images show matching results. Table 1 shows 100% matching results. This shows that sending data from the transmitter to the receiver is very good. Let denote A0x1, A0x2 are the x-axis accelerometer on the transmitter and the x-axis accelerometer on the receiver, respectively. Let us denote A0y1, A0y2 are the y-axis accelerometer on the transmitter and the x-axis accelerometer on the receiver, respectively. Let also denote A0z1, A0z2 is the z-axis accelerometer on the transmitter and the x-axis accelerometer on the receiver, respectively.

Table 2 shows 100% matching results. This shows that sending data from the transmitter to the receiver is very good. Let denote Gx1, Gx2 are the x-axis gyroscope on the transmitter and the x-axis gyroscope on the receiver, respectively. Let us denote Gy1, Gy2 are the y-axis gyroscope on the transmitter and the x-axis gyroscope on the receiver, respectively. Let also denote Gz1, Gz2 is the z-axis gyroscope on the transmitter and the x-axis gyroscope on the receiver, respectively.

In figure 5 shows an image of moving your arms up, this movement starts from the ready position then moves your hands up until straight up to form an angle of 180 degrees. The distance between the transmitter and the receiver is 50 meters for 90 degrees and 180 degrees of arm movement, respectively.

Figure 6 shows the results of the comparison between transmitter and receiver. For figure 6 (a) is a screen capture

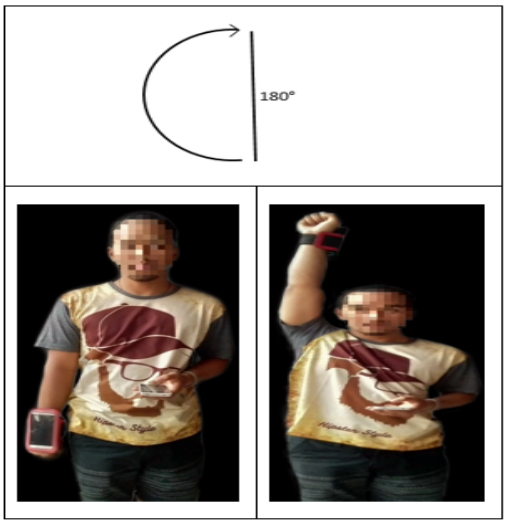

Fig. 5. Up arm motion

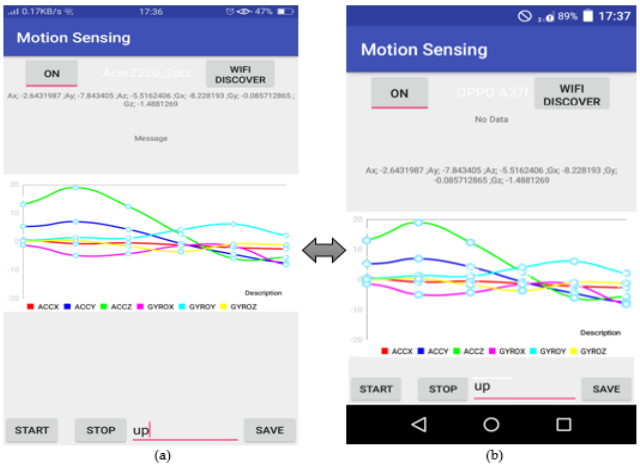

Fig. 6. Screenshots display of up arm motion (a) Transmitter (b) Receiver

TABLE 3. CONFORMANCE LEVEL OF ACCELEROMETER DATA TRANSMISSION FROM UP ARM MOTION

Item	A1x1	A1x2	%	A1y1	A1y2	%	A1z1	A1z2	%
1	1.68	1.68	100%	7.15	7.15	100%	5.38	5.38	100%
2	1.17	1.17	100%	5.30	5.30	100%	13.02	13.02	100%
3	0.67	0.67	100%	6.98	6.98	100%	18.98	18.98	100%
4	-0.74	-0.74	100%	4.29	4.29	100%	12.35	12.35	100%
5	-0.49	-0.49	100%	-0.67	-0.67	100%	2.56	2.56	100%
6	-1.21	-1.21	100%	-4.50	-4.50	100%	-5.98	-5.98	100%

the image on the transmitter from up arm motion, while figure 6 (b) is a screen capture image on an up arm motion receiver side. Both images show also matching results.

TABLE 4. CONFORMANCE LEVEL OF GYROSCOPE DATA TRANSMISSION FROM UP ARM MOTION

Item	G1x1	G1x2	%	G1y1	G1y2	%	G1z1	G1z2	%
1	0.32	0.32	100%	0.13	0.13	100%	0.14	0.14	100%
2	-1.27	-1.27	100%	0.40	0.40	100%	0.10	0.10	100%
3	-4.90	-4.90	100%	1.40	1.40	100%	0.33	0.33	100%
4	-4.26	-4.26	100%	1.19	1.19	100%	-1.66	-1.66	100%
5	-1.49	-1.49	100%	4.17	4.17	100%	-3.59	-3.59	100%
6	-1.64	-1.64	100%	6.13	6.13	100%	-0.93	-0.93	100%

Table 3 shows also 100% matching results of data transmission for up arm motion. This shows that sending data from the transmitter to the receiver is very good. Let denote A1x1, A1x2 are the x-axis accelerometer on the transmitter and the x-axis accelerometer on the receiver, respectively. Let us denote A1y1, A1y2 are the y-axis accelerometer on the transmitter and the x-axis accelerometer on the receiver, respectively. Let also denote A1z1, A1z2 is the z-axis accelerometer on the transmitter and the x-axis accelerometer on the receiver, respectively.

Table 4 shows also 100% matching results of data transmission for up arm motion. This shows that sending data from the transmitter to the receiver is very good. Let denote G1x1, G1x2 are the x-axis gyroscope on the transmitter and the x-axis gyroscope on the receiver, respectively. Let us denote Gy1, Gy2 are the y-axis gyroscope on the transmitter and the x-axis gyroscope on the receiver, respectively. Let also denote Gz1, Gz2 is the z-axis gyroscope on the transmitter and the x-axis gyroscope on the receiver, respectively.

V. CONCLUSIONS

This article presents a comprehensive result of 50 meters distance from smartphone 1 to smartphone 2. The MOSBAN test was taken in 2 arm motions, namely movements with an angle of 90 degrees and 180 degrees, respectively. The validity of MOSBAN is proven by exacted 100% of accuracy data transmission from smartphone 1 to smartphone 2 using Wi-Fi direct. The MOSBAN scheme will be compared with other methods in the next research.

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