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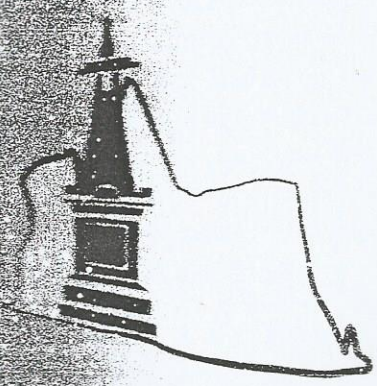
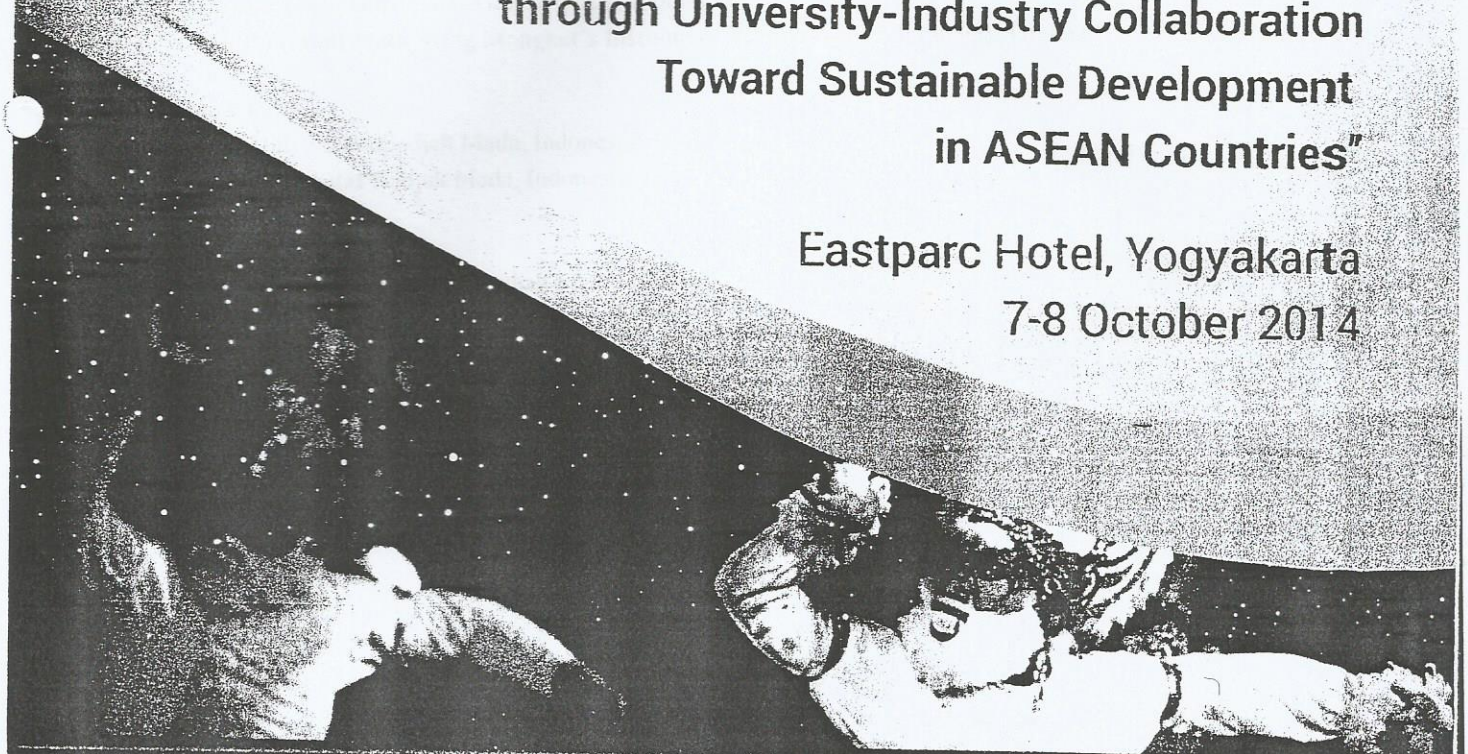


RCCIE 2014

"Enhancement of Communication and Information Engineering Research through University-Industry Collaboration Toward Sustainable Development in ASEAN Countries"

Eastparc Hotel, Yogyakarta
7-8 October 2014



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Message from Acting Executive Director and Chief Advisor of AUN/SEED-Net

On behalf of AUN/SEED-Net, I would like to welcome all participants to the beautiful historical city of Yogyakarta, Indonesia, and to express my sincere gratitude to Universitas Gadjah Mada as the dedicated host of the AUN/SEED-Net Regional Conference for Computer and Information Engineering in 2014. This conference provides a valuable platform to all participants to share research output and discuss the way forward which will further enhance the research and network of Computer and Information Engineering (CIE) in the region.

The theme of the conference, "Enhancement of Communication and Information Engineering Research through University-Industry Collaboration toward Sustainable Development in ASEAN Countries", has been timely given in harmonizing with one of the objectives of Phase III of AUN/SEED-Net. Linkage with industry is extremely important for universities to improve the quality of engineering education and research. As establishment of the AEC (ASEAN Economic Community) is approaching next year, it may be the right time for all of us to get back to the principle of engineering; that is, with its existence, closely associated with industry, society and people.

Since the beginning of Phase III, CIE field has discussed how to sustain the established regional network for a long period. One of the indicators that the team has addressed is cross-border initiatives among researchers in the region. It has been so far evidenced by the increasing number of proposed and also awarded projects under Collaborative Research for Common Regional Issues under SEED-Net, and we are looking at this momentum to be applied to all SEED-Net programs by CIE researchers.

I hope this conference provides an opportunity for productive exchange of knowledge and lessons among participants. And that leads to successful collaboration with a wider range of network, resulting in human resources development in the region for the future prosperity of ASEAN.

Prof. Dr. UEDA Tamon
JICA AUN/SEED-Net Chief Advisor and Acting Executive Director

Schedule
Yogyakarta, 7 – 8 October, 2014

7 Oktober 2014

07.30 – 08.20	Registration
08.20 – 09.00	Opening Ceremony
09.00 – 10.00	User Aware Energy Smart Offices Prof. Marco Aiello; University of Groningen, The Netherlands
10.00 – 10.30	**Group Photo & Coffee Break**
10.30 – 17.10	Parallel Sessions
15.30 – 17.30	Field Management Meeting of AUN/SEED-Net (FMM)
19.00 – 21.30	**Gala Dinner**

8 Oktober 2014

07.30 – 08.10	Registration
08.10 – 09.10	Multi-Task Data Mining toward Automating the KDD Process Prof. Einoshin Suzuki, Kyushu University, Japan
09.10 – 10.10	The East Japan Great Earthquake and Related Robot Technologies Prof. Yoshio Yamamoto, Tokai University, Japan
10.10 – 10.30	**Coffee Break**
10.30 – 11.10	Human-Robot Collaboration: Two Examples with a Humanoid Robot Prof. Jun Miura; Toyohashi University of Technology, Japan
11.10 – 11.50	Study On Distinction of Gender from Front View of Walking Motion Using Kinect Prof. Kazuhiko Hamamoto; Tokai University, Japan
11.50 – 12.10	Award Ceremony
12.10 – 13.30	**Lunch**
13.30 – 15.30	Parallel Sessions
15.50 – 17.50	Member Institution Meeting (Delegation from MI)

PARALLEL SESSIONS

	No	Time	7 October 2014		8 October 2014			
			Dahlia	Tulip	Orchid	Frangipani	Dahlia	Tulip
		Chair	*Yuji Sakamoto*	*Teng Joon Lim*				
		Co-chair	*Hia Trung*	*Risanuri Hidayat*				
	1.	10.30 – 10.50	*Yuji Sakamoto*	MI45				
Session 1	2.	10.50 – 11.10	ID1	MI32				
	3.	11.10 – 11.30	OS4	ID41				
	4.	11.30 – 11.50	MI19	MI34				
	5.	11.50 – 12.10	ID22					
		12.10 – 13.30	**Lunch Break**					
		Chair	*Alwen Tiu*	*Natapon Pantuwong*	*Dwi H. Widyantoro*	*Elmer R. Magsino*	*Carlos Bating*	*Somsak Choomchuay*
		Co-chair	*Thi-Lan Le*	*Dion Firmanda*	*Sutheera Puntheeranurak*	*Neil Irwin Bernardo*	*Samiadji Herdjunanto*	*A. Surarerks*
Session 2	6.	13.30 – 13.50	MI10	ID2	MI24	MI26	MI12	ID42
	7.	13.50 – 14.10	MI14	MI3	MI25	ID27	MI35	MI53
	8.	14.10 – 14.30	MI48	ID21	MI38	MI28	MI37	MI5
	9.	14.30 – 14.50	MI51	MI39	MI52	MI30	MI29	MI54
	10.	14.50 – 15.10	MI8	MI40	MI9	MI50	MI16	MI47
		15.10 – 15.30	**Coffee Break**					
		Chair	*Do Dat Tran*	*Trio Adiono*				
		Co-chair	*Teguh B. Adji*	*Prapto Nugroho*				
Session 3	11.	15.30 – 15.50	ID6	MI18				
	12.	15.50 – 16.10	MI17	MI33				
	13.	16.10 – 16.30	ID20	MI46				
	14.	16.30 – 16.50	ID23	MI13				
	15.	16.50 – 17.10	MI31	MI44				

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ISBN: 978-602-71396-0-2 Yogyakarta, 7 - 8 October 2014

Frame Differencing Motion Detection for Madura Batik Virtual Fitting Room

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Abstract—**Batik is one of traditional heritage from Indonesia, and the pattern of batik in each region of Indonesia is unique and represents the characteristic of the region, such as the Madura batik. Currently, the sale of Madura batik is growth increasingly, since the existence of Suramadu Bridge and the use of information technology by the Madura batik supplier, for instance, social media and e-commerce. The use of Augmented Reality for the Virtual Fitting Room is proposed in this research. The Virtual Fitting Room can be embedded in the e-commerce website, hence, the consumers are able to see, whether the Madura batik cloth is suited for them or not. This research applies the motion detection using frame differencing for the embedding of the Madura batik cloth to the body of consumer. The use of the current information technology, i.e. augmented reality for the virtual fitting room will introduce the Madura batik broadly.**

Keywords—virtual fitting room, augmented reality, motion detection, frame differencing

I. INTRODUCTION

Batik is originally one of the heritages of Indonesia, and UNESCO has decided that Indonesia Batik is Masterpieces of the Oral and Intangible Heritage of Humanity [1]. Pattern and color of Indonesia batik are varied. Based on the *batik spirit of Indonesia* [2], there are at least 181 batik patterns in Indonesia. Each region has its own Batik pattern, and the pattern represents the characteristic of the region, for instance is Madura Batik. The Madura Batik has unique characteristics; they are the color and the motif of the batik. Madura Batik has bright and various color, such as red, yellow, green, and blue as seen in Fig. 1 [3].

Currently, batik is interested product by a lot of people in the world because of the uniqueness of the pattern. In order to promote batik continually, and since the pattern of batik grows increasingly, hence many batik stores do the promotion online. They are using the online media, such as Facebook, Twitter, Instagram, online stores, and e-commerce. The use of the online media makes the batik store updates batik product easily. The online media also make the transaction between the consumer and the stores easier, since the consumer can choose the product without necessarily come to the store.

Madura is also known as the region in Ind
unique pattern for the batik. Because of the S
the sale of Madura batik is growth incre
domestic and international tourists bought b
when they visited Madura. This situation
store from Madura realize that Madura batik
product for the consumer; therefore the loc
online media to promote their batik pro
commerce. The example of e-commerce of
be seen in Fig. 2.

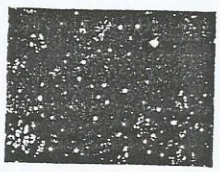

Fig. 1. Madura Batik

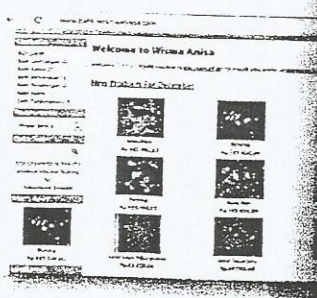

Fig. 2. www.batik-wismaanni

The promotion of Madura batik can be
information technology, i.e. augmented re
reality can be used to build virtual fitting
consumers can try the clothes and see wh
pattern, and the model of batik clothes a
This virtual fitting room can be embedde
such as web site, e-commerce, etc. Virtu
Madura batik is proposed in this researc
paper is organized as follows; augmented re
in the second section, and the third sectio
fitting room for Madura batik in this resea

fifth sections are about the experiment and the conclusion section.

II. AUGMENTED REALITY

Augmented reality is a technology that combines objects from the real world and objects from a virtual world such that the boundary between those worlds is vogue [5]. This Augmented reality is different compare to the virtual reality. In a virtual reality, all objects are not real (virtual), meanwhile in the augmented reality, virtual objects and real objects are combined. In the ideal environment of augmented reality, the real objects and virtual object can't be distinguished as seen in Fig. 3. Fig. 3 shows that there are two real objects (desk and telephone), and three virtual objects (lamp and two chairs) are in the same 3D environment, and can't be distinguished. Therefore, augmented reality is known as a connector between the virtual world and real world [6]

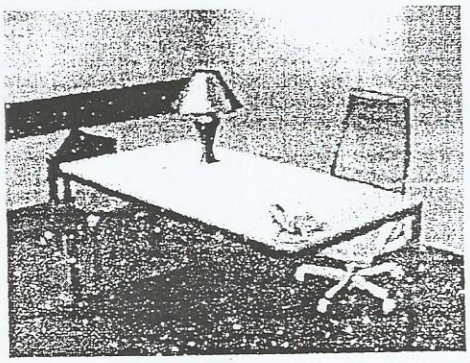

Fig. 3. Real objects and virtual objects are in the same environment [5].

To embed virtual objects in the 3D environment, marker is required as seen in Fig. 4; hence, the virtual objects and real objects can be combined. The virtual objects move wherever the marker moves as shown in Fig. 5.

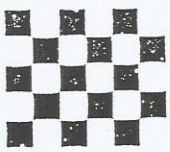

Fig. 4. Example of marker in Augmented Reality

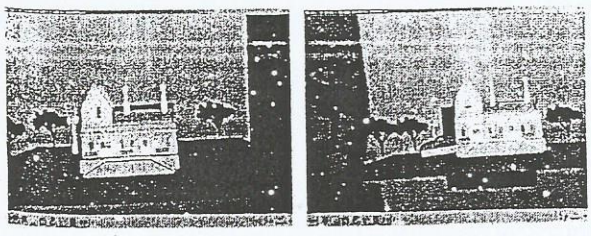

Fig. 5. Augmented reality with marker

The marker for augmented reality can be an image that has a unique pattern as seen in Fig. 4 (chessboard) or some point in the real environment (markerless). In this research, the augmented reality that is built for the virtual fitting room is markerless. Hence, in this virtual fitting room, an image with a unique pattern is not required.

III. VIRTUAL FITTING ROOM

In the clothing stores, fitting room is available in the stores. Hence, the customers can try the clothes and see whether the clothes are suited to them or not. Nowadays, the existence of some clothing stores are replaced by the virtual store, i.e. online stores. The customers can buy the clothes without necessarily come to the stores. Apparently, with the online stores, the customers aren't able to see whether the clothes are suited to them. Therefore, this research proposed the virtual fitting room for the online stores, especially for the Madura batik stores. Combining virtual objects in real objects or known as augmented reality is used to build the virtual fitting room. This research used marker less augmented reality.

Marker that is used for embedding virtual clothes in the real object is the location of the body of the consumer. Hence, the detection process of the body is required in this research. Frame differencing is used to detect the location of body, with the assumption that the only moving object in the video is the body of the consumer. In this methed, every pixel in a current frame is verified, whether this pixel is changed compared to the reference frame. If the pixel is changed, then the pixel is identified as the moving pixel. Usually, the first frame is used as a reference frame [7]. In the verification process, the difference between pixels in the current frame and reference frame is calculated. If the result is bigger than the threshold value, then the pixel is detected as motion pixel. The process is shown in Eq. 1.

$$D(x,y,t) = |F(x,y,t) - F_0(x,y)| \quad \begin{cases} \text{if } D(x,y,t) > Th & \text{then set foreground} \\ \text{if } D(x,y,t) \le Th & \text{then set background} \end{cases} \quad (1)$$

where $F(x,y,t)$ is a pixel value on (x,y) in frame t, and $F_0(x,y)$ is the pixel on (x,y) in the reference frame.

There are four steps to build virtual fitting room in this research as seen in Fig. 6.

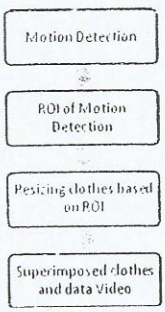

Fig. 6. Diagram for the virtual fitting room.

The first step for building the virtual fitting room is motion detection. In this research, the motion detected by the frame differencing method. This research assumes that the only moving object in the data is the body of the consumer itself. The reference frame that is used in the experiment is the image without the appearance of the body of the consumer. The

example of the reference frame and the current frame can be seen in Fig. 7. The difference between each pixel in the current frame and reference frame is calculated, and the result of the difference is used as the detected motion of the data input.

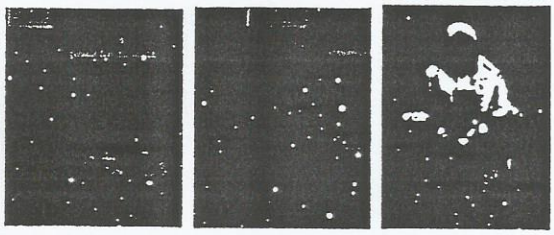

Fig 7. Reference frame (left), current frame (middle), and detected motion (right) of data video

The second step is identifying the Region of Interest (ROI) of detected motion. Since the augmented reality in this research is markerless, then the body of the consumer is used as a marker. The ROI of the body is used as marker, and the virtual clothes are embedded to this ROI. ROI is obtained by finding the outermost pixel of detected motion. The outermost pixels of detected motion are outer left pixel, outer right pixel, outer top pixel, and outer bottom pixel. These pixels are used to determine the ROI as seen in Fig. 8. Fig. 8 shows the ROI in the detected motion. Red rectangle that is shown in the figure is the ROI of detected motion. This rectangle is built by four outermost pixel of the detected motion (left, right, top, and bottom pixels).

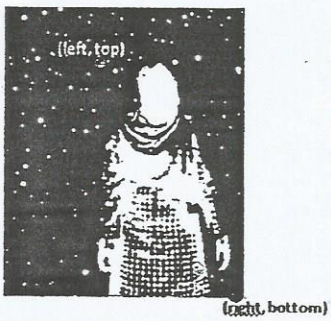

Fig. 8. ROI of the detected motion

The third step is resizing and moving the clothes based on ROI. Hence, the virtual clothes are fitted with the body of the consumer. The last step of this virtual fitting room is superimposing virtual clothes to the data video. The virtual clothes are embedded or superimposed to the detected body of the consumer.

IV. EXPERIMENTS AND DISCUSSION

Virtual clothes are required for the experiments. This research focuses on Madura batik. There are four Madura batik that are used in the experiment as seen in Fig. 9. The virtual clothes are made based on these batiks. The virtual clothes of Madura batik are depicted in Fig. 10. experiment, two persons were trying the virtual clothe virtual fitting room. Each person tried 4 virtual clothe virtual fitting room; therefore, there are 8 experime proposed virtual fitting room.

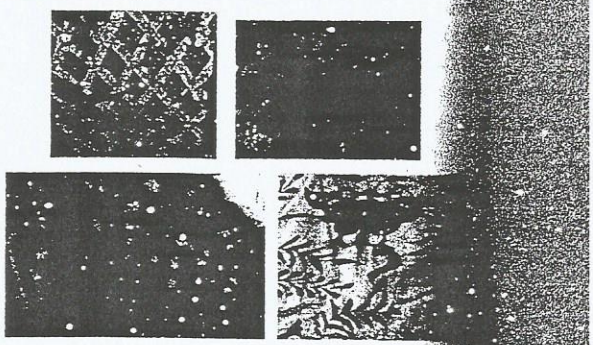

Fig.9 Madura Batik

Fig. 10. Virtual clothes from Madura

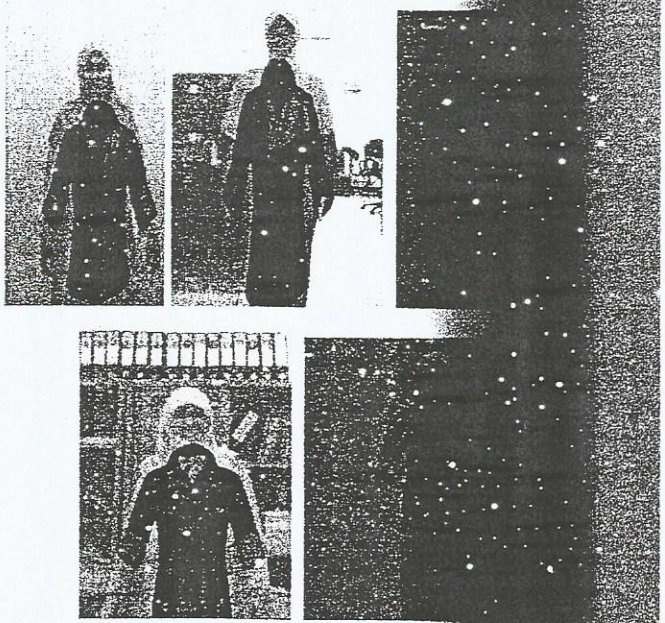

Fig. 11. Virtual fitting room with Madura

ROI of the body of the consumer that is obtained from the motion detection process is used as a marker in virtual fitting room. The marker is used to determine the location of the virtual clothes, i.e., Madura batik clothes.

The virtual fitting room for Madura batik clothes is shown in Fig. 11. Fig. 11 shows that the size and location of virtual batik clothes be matched with the size and location of the body from the consumer. The virtual clothes move wherever the body of the consumer moves. The size of the virtual clothes is resized base on the size of the detected body of the consumer.

V. CONCLUSION

Virtual fitting room for Madura batik clothes in this research can be embedded to the online store of Madura batik. The experiments show that the virtual clothes can move wherever the body of the consumer moves. This virtual fitting room features for the online store makes the consumer easier to identify whether the clothes in the online stores are suited to them or not, hence in the future this feature increase the sale of Madura batik and promote the Madura batik broadly.

Acknowledgment

This research is funded by Directorate General Higher Education

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