KINETATION (Kinect for Presentation): Control Presentation with Interactive Board and Record Presentation with Live Capture Tools

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Abstract. Presentation is one the most common activity performed in various fields of work (e.g. lecturer, employee, manager, etc.). The purpose of presentation is to demonstrate or introduce presenters’ idea to the attendees. Within the given time and specific place, presenters must transfer their knowledge and leave great impression for their audience. Generally, presenters use several handy tools such as mouse, presenter, and webcam to help them to navigate their slides. Nevertheless, some of these tools have several constraints and limitations such as not portable and does not support multimedia. In this research, we develop an application that assist presenters to control their presentation materials by using Microsoft KINECT. In this research, we manipulate colour image, image depth, and the skeleton of the presenters captured by the KINECT. Then, we show the post-process image results into the projector screen. The KINECT has more useful than other tools because it supports video and audio recording. Moreover, it also able to capture presenters’ movement that can be used as an input to interact and manipulate the content (i.e. by touching the projection wall). Not only this application provides an alternative in controlling presentation activity, but it also makes the presentation more efficient and attractive.

1. Introduction

In various type of profession, presentation has become one of the most common activity. Presentation is performed with the help of computer technology. The purpose of presentation is to share knowledges, results, or ideas to other people, generally within the same room. For example, an advertising company try to present their work results to please their employer, or a lecturer in a university teach his/her student with PowerPoint slideshow.

To start presentation activity, presenters must have knowledge or material that they want to share. The act of presentation generally uses computer, mouse, keyboard, and projector. Those tools will be set in a specific room for presentation. To navigate their materials, presenters can press space on the keyboard or right-click on the mouse. Furthermore, they sometimes could also bring a presenter or a pointer to help them navigate the slides. To write notes, presenters usually will be provided white-board and colored-marker.

Those above solutions for presentation has been done for ages and there are not so much different in doing presentation. Nevertheless, some of these tools have several constraints and limitations such as not portable and does not support multimedia. For example, by using a mouse or a keyboard, the
presentation must back and forth from the main stage and the computer just to move to the next slide. That problem could be solved by using a presenter, but a presenter could be missing and has limited battery. Moreover, those solutions cannot record (i.e. video and audio) the activity of presentation.

With the objective of giving better solution for presentation activity, we design and create a smartboard application that can assist act of presentation. Smart board is an interactive board that allows the presenter to display and manipulate presentation’s content to the board directly with the touch [1]. Smart board was first introduced in 1991 by SMART Technologies Company. Users can replace the functions of the monitor into the board or vice versa. Moreover, users can use their finger or an electronic pen (stylus) to interact directly with the board [2]. The result of this research is an application that can help the presenter or teacher to control the presentation of content, add annotations on the screen, and control the mouse pointer using the touch on the board projector. Furthermore, this application can also be used to record video and audio of the presentation activity.

This application was built by using KINECT from Microsoft. Introduced as the complimentary device for XBOX game console, KINECT is a gaming sensor to detect people and the movements of the people in the game situation (e.g. running, jumping, dodging, etc.). Nowadays, KINECT’s impact has extended beyond the gaming industry [3]. It helps in the area of education [4] [5], healthcare [6], indoor mapping [7], and robot [8]. Those are some examples of KINECT Effect in various work area.

![Figure 1 - Microsoft KINECT](image)

The KINECT is used to detect the gesture of the presenters or the users. The gesture recognition that is done in here is optical camera-based methods [9]. Moreover, the presenters provide input on a computer that is currently active, and then run a process such as controlling a mouse pointer and navigate the presentation’s content. Gesture will be used as input to navigate presentations that simplify the presenter to navigate. The input will be wireless and ease the input from the presenters. Moreover, the KINECT is always connected to the electricity, thus it will always have batteries.

The use of KINECT is chosen because KINECT has decent camera sensor and built-in microphone as shown in the Figure 1. Thus, our application could utilize those features to navigate and record presentation within the same application. Compared with webcam, it only provides a camera feature. There is also a tool called leap motion. However, this tool is limited as only a hand-detection sensor. We believe, this application can increase efficiency and effectiveness of the presentation. It is because the slide navigation, annotation process, and record of presentation can be done within the same
application. After the presentation, the annotated slides or materials and videos can be shared to the viewers for them as a tutorial or review material.

2. Related Works
Based on our observation, this type of research has been done by several researchers which are: Beeboard: From WiiMote to Interactive Whiteboard Application for Classroom [10] and The Implementation of Hand Detection and Recognition to Help Presentation Processes [11].

The prior research utilizes the WiiMote controller from Nintendo Wii Game Console for its sensor. The Wii Remote, as shown in the Figure 2, will be projected to the screen and searching for the infra-red pen tools. The presenter uses the infra-red pen tools, as shown in the Figure 3, to point to the projection screen and make selection with it. BeeBoard provides features for video recording along with the sound of the presenter, but required an additional tool in the form of a microphone and had to use infrared pen tools to be able to navigate.

![Figure 2 - Nintendo WiiMote](image)

![Figure 3 - Infra-Red Pen Tools](image)

The latter research implements hand detection and recognition to help presentation by using a pattern of hand to control a PowerPoint slide as start slide show and slide navigation. It uses a webcam as the sensor to detect hands and fingers. The signal of the finger will become the input for the system and will be do pre-set actions (e.g. next slide, previous slide, etc.).

3. System Overview
To build this application, we have designed the architecture of the system. The design can be seen in the Figure 4. The design is used to show overall process of the system. The computer is connected with a KINECT and a projector. The application run in the computer and communicate with the KINECT and the projector. Gesture sensors on the KINECT will be activated to detect movement made by the presenter. The projector, as usual, will display computer screen to the display board.

Presenter give input to the computer by touching the board and those gestures will be captured by the KINECT sensor. The detected input then will be used as an action on the application. The application will perform the action and will be shown in the display by projector (e.g. give annotation to slides, next slide, etc.). The gesture will be similar with manipulating content on the tablet. We choose this approach because users are already familiar with it. The gestures are: touch and drag left for next slide, touch and drag right for previous slide, touch and drag up to show menu, and touch and drag down to show PowerPoint overview. The presenters could also record their presentation activities by simply touch the record button in the application. The KINECT will start recording and the results could be later use for reviews or documentations.
With this application, the presenters can do several functions which are: calibrate screen, pencil mode, navigate cursor, annotate slides, undo, and redo annotation, draw simple figure (i.e. circle, triangle, and square), navigate PowerPoint, erase canvas, open PowerPoint slide, register PowerPoint slide to the presentation list, start presentation, and record video and audio.

![Figure 4 - KINECTATION’s System Architecture](image_url)

As we have said before, this application detects the presenter gesture and transform it to become input for the system. To detect the gesture, screen calibration must be done in the first step. The Figure 5 below explained the detailed steps for calibration:

### 4. Result and Discussions

We implement our system in the room of laboratory at Bina Nusantara University. The computer has dual-core, 2.66-Ghz and 2 GB of RAM. Moreover, the operating system should be minimum Windows 8 and 64-bit (x64). After the system is ready to be use, we conduct user evaluation that invites 35 people. The respondents work as lecturer and assistant laboratory. The evaluation consists of 18 questions that measure the accuracy, the ease to use, and user interface. The system can be seen in the Figure 6.

For the presentation navigation by using KINECTATION, 82.4% of respondent say it is easy to do. But, 17.7% found it is harder to navigate by using the application because they are not familiar with the input gestures. Moreover, 100% respondents agree that the recording materials from the presentation are useful for reviews and tutorials. For the annotation feature for the slide, 24% people says that the feature is not useful, while the rest find it quite useful. In the user interface, 74% respondent already familiar with the input and the menu. Nevertheless, 26% respondent says it is difficult and confusing.

In short, 30% of respondent is very satisfied with the result of the application, 62% of respondent is quite satisfied, but think that the application could be more improved. Then, 8% of respondent do not think that this application is suitable for presentation tools. With these results, we believe KINECT could be used for presentation tools in the near future. Not only it will ease the presentation system and more interactive, but it could directly record the presentation and make it as review materials.
5. Conclusion and Future Works

In this paper, we present KINECTATION (Kinect Presentation) application, a tool to help presenters navigate their presentation materials. Moreover, KINECTATION can also be used to record audio and video of the presentation. We also have shown the system architecture and calibration step for our system. Moreover, the user evaluation shows positive results that says 92% of the respondents are satisfied. Thus, we believe KINECT is a promising tool to be integrated into the presentation room.
In the future works, we hope we could bring voice commands as additional features for our application. Moreover, we also plan to add feature to save annotation result as separated images (not saved in the slides).

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