UNIVERSITI TEKNOLOGI MARA

Public Interest Centre of Excellence

International Teaching Aid Competition 2023

Reconnoitering Innovative Ideas in Postnormal Times

iTAC 2023

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INTERNATIONAL TEACHING AID COMPETITION
E-PROCEEDINGS

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PREFACE

iTAC or International Teaching Aid Competition 2023 was a venue for academicians, researchers, industries, junior and young inventors to showcase their innovative ideas not only in the teaching and learning sphere but also in other numerous disciplines of study. This competition was organised by the Special Interest Group, Public Interest Centre of Excellence (SIG PICE) UiTM Kedah Branch, Malaysia. Its main aim was to promote the production of innovative ideas among academicians, students and also the public at large.

In accordance with the theme "Reconnoitering Innovative Ideas in Post-normal Times", the development of novel ideas from the perspectives of interdisciplinary innovations is more compelling today, especially in the post-covid 19 times. Post-pandemic initiatives are the most relevant in the current world to adapt to new ways of doing things and all these surely require networking and collaboration. Rising to the occasion, iTAC 2023 has managed to attract more than 267 participations for all categories. The staggering number of submissions has proven the relevance of this competition to the academic world and beyond in urging the culture of innovating ideas.

iTAC 2023 committee would like to thank all creative participants for showcasing their innovative ideas with us. As expected in any competition, there will be those who win and those who lose. Congratulations to all the award recipients (Diamond, Gold, Silver and Bronze) for their winning entries. Those who did not make the cut this year can always improve and join us again later.

It is hoped that iTAC 2023 has been a worthy platform for all participating innovators who have shown ingenious efforts in their products and ideas. This compilation of extended abstracts published as iTAC 2023 E-Proceedings contains insights into what current researchers, both experienced and novice, find important and relevant in the post-normal times.

Best regards,

iTAC 2023 Committee
Special Interest Group, Public Interest Centre of Excellence (SIG PICE)
UiTM Kedah Branch
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AUGMENTED REALITY IN OPERATING ROUNDNESS MEASURING MACHINE

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ABSTRACT
This study will look into the development of Augmented Reality (AR) to enhance student in operating Roundness Measuring Machine. Some challenges that users especially students have problems when conduct the measurement of roundness using the roundness measuring machine. The roundness measuring machine is one of precision measuring devices for measuring the physical geometrical characteristics of the product. Measurements are defined by a measuring probe touch the surface of the product. Thus, the roundness measuring machine need to conduct properly. Currently, students are unable to understand and follow the machine's standard operating procedure properly. Students are difficult to operate the machine due to a lack of information or knowledge. Most of the time, students need guidance in order to operate the machine. To overcome this limitation, this study proposed a method to guide the students how to operate the machine based on the use of AR with standard of procedures. The AR allows for machining simulation on an actual machine tool without need to apply machining rules, or apply theories which can lead in more precise technique. The newly developed method can assist the user in conducting the machine wisely. The effectiveness and performance of the AR system was checked. Thirty students have been selected to conduct the machine using the AR with and without audio. The result found the average time it takes the AR with audio group to finish a task is 14.79 minutes and without audio is take 22.08 minutes.

Keywords: roundness measuring machine, augmented reality, measurement

INTRODUCTION

Augmented reality (AR) is advanced technology that can provide significant advantages to the education industries. The implementation of AR technology in education system have shown a significant contribution to students, teachers, learning and teaching process and environments. At present, there are few universities and academic institution play an important role in the development of AR technology (Cipresso et al., 2018). The significance of AR in education with providing a self-oriented space for exploration for learners in the interaction mode closest to real life (Cai et al., 2013) and provide innovative development of society, it is called Industry 4.0 (Hlod & Doroshenko, 2021). The AR technology research has made great progress in the intelligent display technology, 3d registration technology and intelligent interaction technology (Chen et al., 2019). AR technology is one of the effective tools that will help to teach science vocabulary (Kellems et al., 2019)(Tobar-Muñoz et al., 2015) and teaching strategy for increasing math proficiency for students (Sommerauer & Müller, 2014).

The AR system solution may assist new employees, technicians, and students in operating the equipment using their cell devices. When designing an AR system, three aspects must be in mind which is combination of real and virtual worlds, interactivity in real time and registration in 3D (Bekhit, 2022). The AR applications classify into for different categories such as training applications, requests for assistance, design applications and planning and validation of requests (Rebbani, 2021).

The machine's portable device procedure software system demonstrates how to utilize the machine from beginning until the end. AR system approach has the potential to reduce errors and to improve methods for the inspection (Mekni & Lemieux, 2014).
There are two categories of research on integration of AR into education: games and e-learning (Cai et al., 2013). AR in e-learning contexts entails combining digital information within an existing environment (physical, real-world settings), where the elements are augmented or supplemented through computer-generated sensory inputs that may include video, sound, GPS data, graphics and visualizations (Alzahrani, 2020).

In this study, the AR system was created for e-learning purpose to provide a step-by-step guidance in order to conducting the roundness measuring machine in metrology laboratory. The AR system will help the students to implement effective standard operating procedure (SOP) and to help them perform their jobs. The application of SOP is more important and have the role of minimizing errors (Hanafi & Sholihah, 2017) that may occur due to misinterpretation or miscommunication of information (Amare, 2012).

METHODOLOGY

Fusion 360 was used to create the CAD model for the augmented reality software, while Unity 3D was used to create the user interface and Visual Studio was used to write the system's code. This tool is great for entry-level developers because of its easy and simple core procedures. The roundness measuring machine's prototype will be designed in Fusion 360. In addition, Fusion 360 is packed with manuals that cover every aspect of mechanical design. The roundness measuring machine CAD model was developed in Fusion 360. The specifics of the roundness measuring machine used to create a number of components were thought about during the design phase. The Figure 1 shows the model of Fusion 360 of roundness measuring machine that has been create.

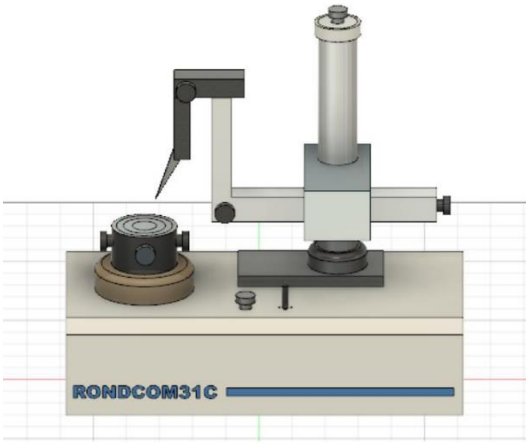

Figure 2. Model of roundness measuring machine

RESULT AND DISCUSSION

The main menu interface consists of three buttons labelled "START," "ABOUT," and "EXIT," as illustrated in Figure 2. Users can access additional details about the roundness measuring machine component and the device by selecting the "ABOUT" option. Clicking the "START" button will take user to the next scene where user need to scan the QR Code. When the user is done with the augmented reality experience, they may simply press a "Quit" button to exit the app. This AR system developed for those need to conduct the roundness measuring machine.

Figure 2. Main menu of AR roundness measuring machine

The AR system can be used after downloading the given APK file. The user needs to scan the QR code and all the procedure about conducting roundness measuring machine will be displayed. The effectiveness of the AR system has been tested. The AR roundness measuring machine has been distributed to 30 students. Figure 3 shows the AR system testing by students. All the respondents need to conduct the roundness measuring machine using AR system. There have two types of AR roundness measuring machine which is AR with audio and AR without audio. As a result, the students need 14.79 minutes with AR with audio compared to AR without audio, 22.08 minutes in order to conduct the roundness measuring machine.

Figure 3. Conducting roundness measuring machine using AR system

CONCLUSION

The analysis of the AR technology for conducting roundness measuring machine is performed. According to the analysis, the implementation of AR technology in education system especially in terms of teaching and learning process has an impact on students' knowledge and skills. The analysis shows that the students need 14.79 minutes with AR with audio compared to AR without audio, 22.08 minutes. The results shows that the use of AR technologies in education is efficient and successful results are obtained.

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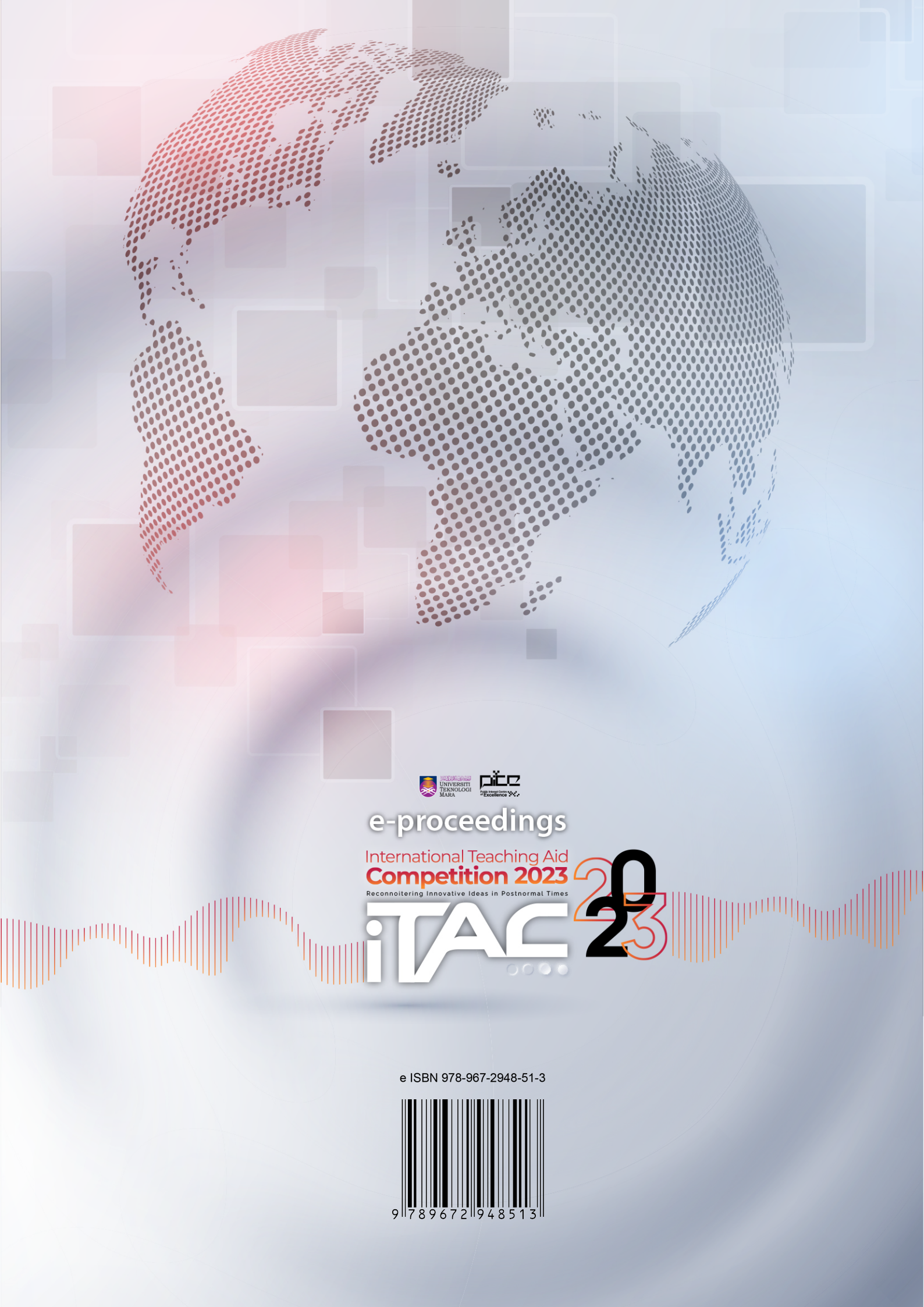

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