



INTERNATIONAL EXHIBITION & SYMPOSIUM ON PRODUCTIVITY, INNOVATION, KNOWLEDGE & EDUCATION

“Optimizing Innovation in Knowledge, Education and Design”

EXTENDED ABSTRACT



e ISBN 978-967-2948-56-8



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eISBN 978-967-2948-56-8

Published by:
Universiti Teknologi MARA (UiTM) Cawangan Kedah,
Sungai Petani Campus,
08400 Merbok,
Kedah,
Malaysia.

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Assalamualaikum warahmatullahi wabarakatuh,



First and foremost, I would like to express my gratitude to the organizing committee of i-Spike 2023 for their tremendous efforts in bringing this online competition a reality. I must extend my congratulations to the committee for successfully delivering on their promise to make i-Spike 2023 a meaningful event for academics worldwide.

The theme for this event, 'Optimizing Innovation in Knowledge, Education, and Design,' is both timely and highly relevant in today's world, especially at the tertiary level. Innovation plays a central role in our daily lives, offering new solutions for products, processes, and services. By adopting a strategic approach to 'Optimizing Innovation in Knowledge, Education, and Design,' we have the potential to enhance support for learners and educators, while also expanding opportunities for learner engagement, interactivity, and access to education.

I am awed by the magnitude and multitude of participants in this competition. I am also confident that all the innovations presented have provided valuable insights into the significance of innovative and advanced teaching materials in promoting sustainable development for the betterment of teaching and learning. Hopefully, this will mark the beginning of a long series of i-Spike events in the future.

It is also my hope that you find i-Spike 2023 to be an excellent platform for learning, sharing, and collaboration. Once again, I want to thank all the committee members of i-Spike 2023 for their hard work in making this event a reality. I would also like to extend my congratulations to all the winners, and I hope that each of you will successfully achieve your intended goals through your participation in this competition.

Professor Dr. Roshima Haji Said
RECTOR
UiTM KEDAH BRANCH



WELCOME MESSAGE (i-SPIKE 2023 CHAIR)



We are looking forward to welcoming you to the 3rd International Exhibition & Symposium on Productivity, Innovation, Knowledge, and Education 2023 (i-SPIKE 2023). Your presence here is a clear, crystal-clear testimony to the importance you place on the research and innovation arena. The theme of this year's Innovation is "*Optimizing Innovation in Knowledge, Education, & Design*". We believe that the presentations by the distinguished innovators will contribute immensely to a deeper understanding of the current issues in relation to the theme.

i-SPIKE 2023 offers a platform for nurturing the next generation of innovators and fostering cutting-edge innovations at the crossroads of collaboration, creativity, and enthusiasm. We enthusiastically welcome junior and young inventors from schools and universities, as well as local and foreign academicians and industry professionals, to showcase their innovative products and engage in knowledge sharing. All submissions have been rigorously evaluated by expert juries comprising professionals from both industry and academia.

On behalf of the conference organisers, I would like to extend our sincere thanks for your participation, and we hope you enjoy the event. A special note of appreciation goes out to all the committee members of i-SPIKE 2023; your dedication and hard work are greatly appreciated.

Dr. Junaida Ismail

Chair

3rd International Exhibition & Symposium Productivity, Innovation, Knowledge, and Education 2023 (i-SPIKE 2023)

EVOLUTION MEASURING TAPE (Ev_MeTa-Cx)

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ABSTRACT

The Evolution Measuring Tape (Ev_MeTa-Cx) is an innovative measuring tape that derives inspiration from conventional measuring tapes. One key distinction between conventional tape measures and Ev_MeTa-Cx is the method by which dimensional measurements are obtained. Conventional tape measures rely on manual measurements conducted by users in the field, but Ev_MeTa-Cx simply has to be positioned within the measuring space, after which the space is captured and seen using Ev_MeTa-Cx. The measurement of the object will be obtained by analyzing the image using a specialized smartphone application called ImageMeter. One of the benefits of utilizing Ev_MeTa-Cx is its ability to streamline the process of measuring dimensions, resulting in time and manpower savings. The use of a laser that has been upgraded to be able to detect up to 100 meters further simplifies the measurement work that has been limited so far. This is achieved by simply capturing the spatial information of Ev_MeTa-Cx. There is a significant disparity between the standard tape and the alternative being discussed, particularly in situations where there is a substantial area to be measured and numerous measures are necessary. Moreover, Ev_MeTa-Cx has the ability to detect an infinite number of measurements beyond the constraints of a conventional measuring tape, with the extent of detection being contingent upon the length of the tape. Ev_MeTa-Cx offers the benefit of serving as a gauge, however, its significance lies in its potential as an educational tool for familiarizing students with the application of information technology in the field of measurement. This aligns with the principles of Education Revolution 5.0, Industrial Revolution 4.0, and Sustainable Development Goal (SDG) pertaining to Quality Education.

Keywords: Evolution Measuring Tape, Unlimited Measurement, Time Efficiency, Teaching Tool

INTRODUCTION

In civil engineering, measurement work cannot be separated, especially in subjects that require further calculations after the basis of measurement is made. Accurate measurements play a crucial role in the construction industry as they are vital in assuring the delivery of high-quality work. Various measuring instruments have been devised to facilitate precise measurements by workers. Nevertheless, it is important to acknowledge that these systems may encounter challenges related to manipulation, namely in terms of tap and gesture interface requirements (Xin Wang et al., 2023). When use traditional measuring methods, it is not always possible to obtain precise measurements consistently. In order to mitigate said inaccuracy, the utilization of a smart measuring tape presents itself as a superior alternative, as it enhances precision, ease, and adaptability (Dhakiphale et al., 2020). In addition, a problem that often occurs among students is the limited time during the process of taking measurements in the field using conventional methods. On that basis, an evolution needs to be implemented to simplify measurement work so as to save time and human resources. Then, Evolution Measuring Tape (Ev_MeTa-Cx) was created which was inspired to make it easier for users to get measurements more quickly to replace conventional methods. The user needs to direct Ev_MeTa-Cx to the part/object to be measured. A picture of the part or object is taken using a mobile phone. The image recorded will then be analyzed using the ImageMeter application which can be downloaded for free. This application is used for getting the size of the part or object which is recorded.

Ev_MeTa-Cx Components

This evolution measuring tape consists of several components where each component plays an important role to get a more accurate measurement as shown in Figure 1.

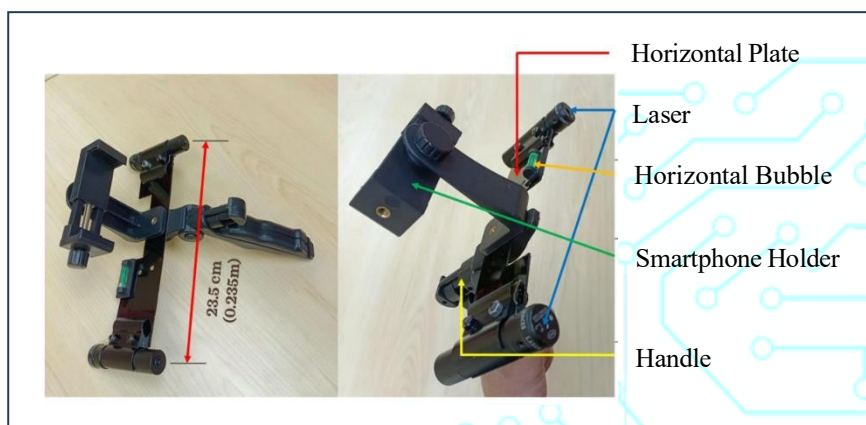


Figure 1. The Main Component in Ev_MeTa-Cx

Ev_MeTa-CX USAGE PROCEDURE

Table 1 shows the function of each component in Ev_MeTa-Cx to help measurement work can be carried out in a more user-friendly way.

Table 1. The Function of Each Components

Components	Function
Horizontal Plate	The main component to support all other components in the tool
Laser	To shoot at any target object through two points that serve as a reference scale
Horizontal Bubble	As an option if the shot target is to be made horizontally
Smartphone Holder	To place any smartphone model and size because it can be adjusted
Handle	To hold equipment more comfortably and easily

For a better understanding of how to use this equipment, here are the simple steps that need to be followed:

Step 1: To get the height and width of the door, turn on the laser and point the Smartphone at the surface to be measured so that two laser points measuring 23.5cm from the middle point between each other will hit anywhere the surface of the wall as shown in Figure 2. Horizontal Bubble is used as a benchmark so that the pictures taken are neater and horizontal.

Step 2: Once two laser points hit anywhere the surface part, pictures will be taken via smartphone (Figure 3)

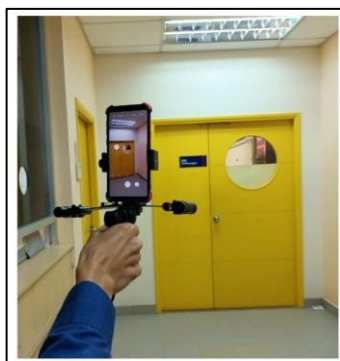


Figure 2. The laser is turned on and aimed at the desired spot



Figure 3. Photo of Two Laser Points Taken Via Smartphone

Step 3: By using the 'ImageMeter' application which can be downloaded through the 'Play Store', image which has been taken can be seen from this application for make any measurements on the picture as shown in Figure 4.

Step 4: Through the ImageMeter application, use Reference Scale on two laser points which is equal to 23.5 cm. The distance between these two laser points will be made as a reference scale to get any the actual size on the picture (Figure 5).

Step 5: Through the ImageMeter application, using the item 'Dimension', any actual measurement on the pictures taken can be easily obtained as can be seen in Figure 6.



Figure 4. The ImageMeter application to view the photos that have been taken

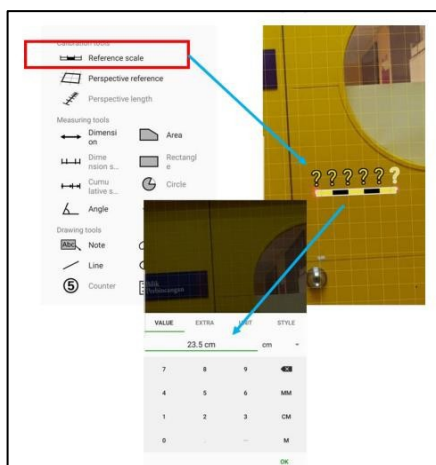


Figure 5. Two Laser Points Are Used as Reference Scale

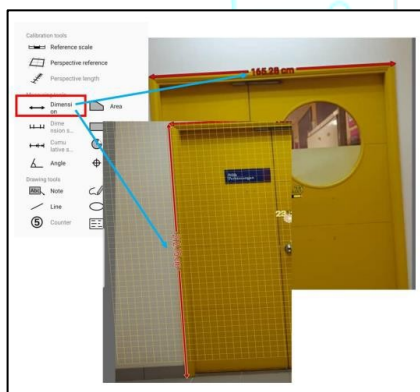


Figure 6. Any Actual Measurements Can Be Obtained on Any Part in The Image

CONCLUSION

The use of Ev_MeTa-Cx measurement tool is expected to help many users especially the students to do any basis measurements in the fieldwork more easily and quickly. The creation of this equipment can also be used as a catalyst for higher quality education which can meet the requirements of Industry 5.0. Industry 5.0 refers to the cooperation between the technologies and educators and students to enhance the efficiency and effectiveness of teaching and learning (Al-Emran & Al-Sharafi, 2022). This is because the evolution of this measurement tool can have a positive impact as following:

- i. Saves time and human energy - when measuring dimensions any parts and objects as they are only involves recording photos.
- ii. Dimensional measurements for large space - Simplify when needed and it certainly involves a lot of measure to make.
- iii. Quality of education - Revolution 5.0, Industrial Revolution 4.0 and Sustainable Development Goals (SDG)
- iv. As a teaching tool - can be used to reveal students adapt the use information technology

ACKNOWLEDGEMENT

We would like to express our appreciation to the State Executive Committee and the entire Staff at Civil Engineering Studies, UiTM Pahang Branch for their support in producing this project. This appreciation also goes to all those involved directly or indirectly in providing the information needed in the production of this product.

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e ISBN 978-967-2948-56-8

