



E-PROCEEDINGS

INTERNATIONAL TINKER INNOVATION & ENTREPRENEURSHIP CHALLENGE (i-TIEC 2025)

"Fostering a Culture of Innovation and Entrepreneurial Excellence"



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23 January 2025
PTDI, UiTM Cawangan Johor
Kampus Pasir Gudang

ORGANIZED BY:

Electrical Engineering Studies, College of Engineering
Universiti Teknologi MARA (UiTM) Cawangan Johor
Kampus Pasir Gudang
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PREFACE

It is with great pleasure that we present the e-proceedings of International Tinker Innovation & Entrepreneurship Challenge (i-TIEC 2025), which compiles the extended abstracts submitted to the International Tinker Innovation & Entrepreneurship Challenge (i-TIEC 2025), held on 23 January 2025 at **PTDI, Universiti Teknologi MARA (UiTM) Cawangan Johor, Kampus Pasir Gudang**. This publication serves as a valuable resource, showcasing the intellectual contributions on the invention and innovation among students, academics, researchers, and professionals.

The International Tinker Innovation & Entrepreneurship Challenge (i-TIEC 2025), organized under the theme "Fostering a Culture of Innovation and Entrepreneurial Excellence," is designed to inspire participants at various academic levels, from secondary students to higher education students and professionals. The competition emphasizes both innovation and entrepreneurship, encouraging the development of product prototypes that address real-world problems and have clear commercialization potential. By focusing on technological and social innovations, i-TIEC 2025 highlights the importance of turning creative ideas into viable, market-ready solutions that can benefit users and society. The extended abstracts in this e-proceedings book showcase the diverse perspectives and depth of research presented during the event, reflecting the strong entrepreneurial element at its core.

We extend our sincere gratitude to the contributors for their dedication in sharing their innovation and the organizing committee for their hard work in ensuring the success of the event and this publication. We also appreciate the support of our collaborators; Mass Rapid Transit Corporation Sdn. Bhd. (MRT Corp), Universitas Labuhanbatu, Indonesia (ULB), Universitas Riau Kepulauan, Indonesia (UNRIKA) and IEEE Young Professionals Malaysia, whose contributions have been instrumental in making this event and publication possible.

We hope that this e-proceedings book will serve as a valuable reference for researchers, educators, and practitioners, inspiring further studies and collaborations in both innovation and entrepreneurship. May the knowledge shared here continue to spark new ideas and market-ready solutions, advancing our collective expertise and fostering the growth of entrepreneurial ventures.

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ABSTRACT

Astrotourism is an emerging feature of science tourism that aims to foster an innovative and entrepreneurship through tourism for astronomical education with unique experiences. This aim to enhance the user experience alongside promoting astronomy as a learning tool for KUSZA Observatory. As a science tourism, it seeks to fill the gaps in astronomy education and low awareness of astrotourism. The innovation lies in encouraging technology of educational courses, sociological activities and environmentally tourism packages to provide teaching and learning behavior. The core activities are astronomy modules where students can use augmented reality and participate in guided stargazing sessions. This science communication complemented by tourism activities from observatory visits where the initiation comes from. The project makes positive input to the macroeconomics of the area by stimulating student's interest in STEMs, creating jobs for the locals and expanding the tourism sector. From the environmental perspective, it advocates against excessive light pollution and promotes eco-friendly activities. The initiative has great potential for commercialization and can help KUSZA Observatory into a leading center of astrotourism, increasing inflow of tourists and raising scientific awareness. This invention embodies the convergence of education, tourism and entrepreneurship that brings a transformation both to the state and global levels.

Keywords: Astrotourism, Science Tourism, Astronomy Education, Innovation and KUSZA Observatory.

1. Product Description

The proposed project, Astrotourism Innovation and Entrepreneurial Excellence, introduces a comprehensive science tourism initiative aimed at enhancing user experiences and advancing astronomy education at the KUSZA Observatory, Universiti Sultan Zainal Abidin. This project integrates innovative educational and tourism elements to create an immersive and sustainable astrotourism experience. The product combines advanced tools such as augmented reality (AR) for interactive learning and modular astronomy education programs tailored for diverse audiences, including students, researchers, and tourists. Features

include guided stargazing tours, hands-on astronomy workshops, and the use of cutting-edge observational technology to provide real-time celestial experiences.

Designed for seamless integration with the existing infrastructure of the KUSZA Observatory, the program emphasizes user engagement and environmental sustainability. Its modular structure allows for customization based on audience needs, ranging from basic astronomy education for beginners to advanced workshops for enthusiasts. The commercialization model involves packaging these experiences into premium tourism offerings, including overnight stays, special events during astronomical phenomena, and collaborations with local communities to promote eco-tourism. This initiative not only generates revenue but also raises awareness about astronomy and sustainable practices, creating a dual impact on socio-economic growth and environmental preservation.

Figures, charts, and detailed activity descriptions illustrate the program's flow, beginning with user engagement, content delivery, and post-activity feedback to continually refine offerings. This holistic approach ensures the product's scalability and adaptability, making KUSZA Observatory a premier destination for global astrotourism.

2. Methods and Flow Chart

The Astrotourism Innovation and Entrepreneurial Excellence project at KUSZA Observatory offers an immersive experience combining stargazing, interactive AR learning, and workshops on astronomy. Visitors register online or offline, and activities are tailored for different groups like students and tourists. The program includes guided tours, hands-on sessions, and educational materials. It promotes eco-friendly practices, reduces light pollution, and offers unique tourism packages. Feedback from participants helps improve the experience, making KUSZA Observatory a leading destination for astrotourism.

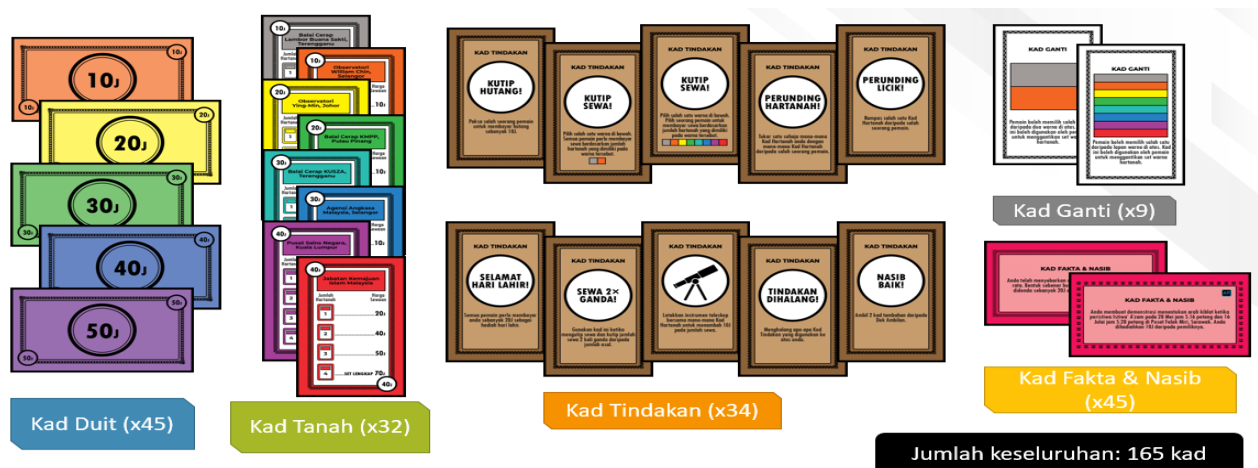


Figure 1. Components of Astronomy Module that uses AR technology.

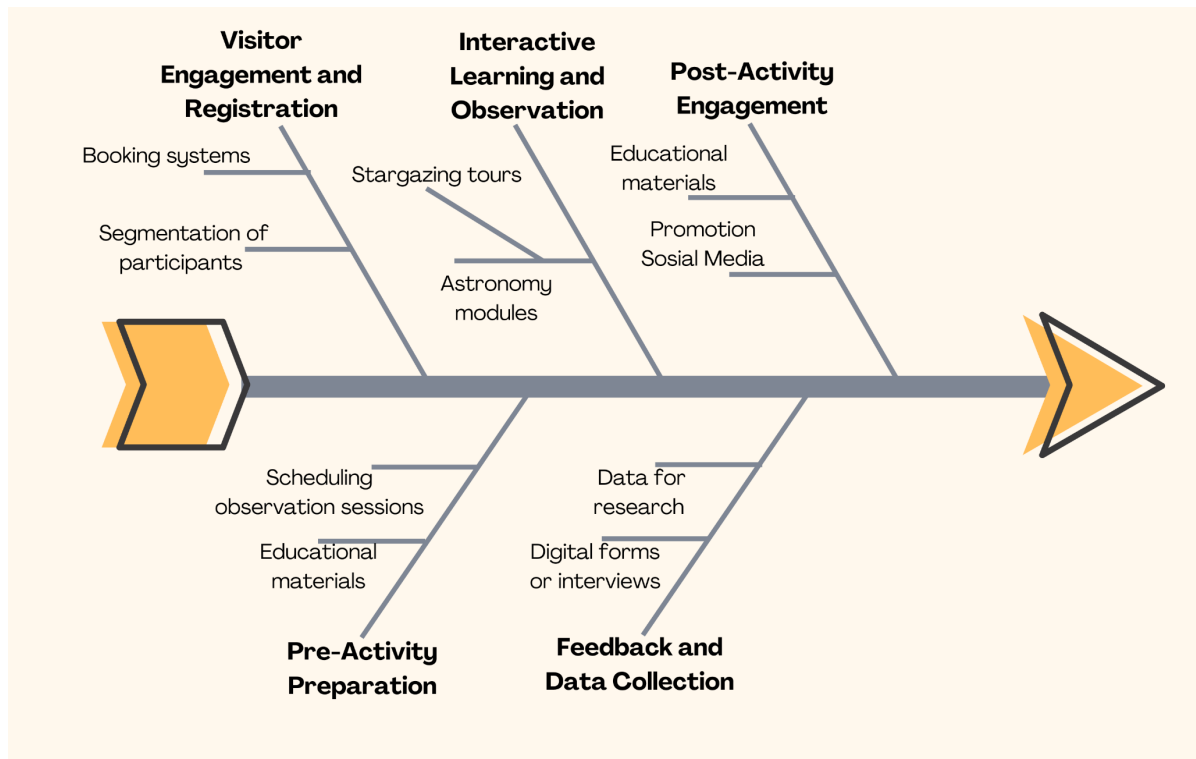


Figure 2. Method flow chart for the Astrotourism Innovation and Entrepreneurial Excellence project.



Figure 3. Funnel Diagram for Astrotourism product model design.

3. Novelty and uniqueness

The Astrotourism Innovation and Entrepreneurial Excellence project introduces a Combining science, advanced technologies, sustainability and community engagement, the Astrotourism Innovation and Entrepreneurial Excellence project can be seen as a new form of tourism. The use of Augmented Reality (AR) tools is exceptional to the project as it enables participants to interact with certain celestial objects and makes their engagement with astronomy much easier since most of the AR tools bring astronomy closer to everyone. This technology extends the audience interested in basic and advanced astronomy even more as it engages students and researchers alike. Instead, the project includes interactive augmented reality modules, remote sky observing, and in-person training into the project which significantly enhances effectiveness and personalization in comparison to traditional lessons at an observatory center. This characteristic feature allows for enhancement of the process via individual requirements such as educational or recreational programs. In addition, the project tackles light pollution and incorporates environmentally friendly measures to ensure the selected goals align with the worldwide objectives.

4. Benefit to mankind

The Astrotourism Innovation and Entrepreneurial Excellence project offers significant benefits through the support of scientific literacy and social entrepreneurship, socio-economic development promotes the Astrotourism. By using augmented reality (AR) applications and practical activities in astronomy, the project makes learning astronomy easy and exciting to all including students and the public which stimulates interests in STEM. The project supports socio-economic and science literacy advancement. The project does further encourage sustainable socio-economic development by promoting Science related literacy to wider audience and discourages light pollution and practicing sustainable tourism thereby enhancing global efforts to conserve the natural outdoor spaces The project does boost local tourism, small businesses and communities into tourism activities therefore creating business opportunities. The project boosts social enterprises and cultural understanding in astronomy while promoting the care for nature. It exemplifies how tourism in science can unite education, the building of society, and protection of nature when combined in a lasting way for individuals and society alike. The project aims at creating a model that encourages a better and inclusive society in the future.

5. Innovation and Entrepreneurial Impact

The Astrotourism Innovation and Entrepreneurial Excellence initiative by incorporating not only augmenting educational approaches such as an application of augmented reality but also with interactive tourism experiences. This method completely changes how astronomy is taught and provides an opportunity for a wider range of people to get involved by making the subject more engaging and interesting. The project also caters to problems that have occurred with science outreach and tourism models by attaching real-time view of the sky and ad-hoc modular programs. In an entrepreneurial sense, the project encourages the development of regional economies through providing opportunities to small businesses of local guides, and tourism suppliers and sellers' of items related to astronomy. In this regard, it collaborates with schools, universities, industries and other agencies, therefore

strengthening its benefits in all spheres including business and research. The project encourages individuals and communities to devise strong business models and solutions and set targets to contribute to the growth of the astrotourism industry and its engagement to both local and global audience through its unique combination of technology, education and tourism.

6. Potential commercialization

The Astrotourism Innovation and Entrepreneurial Excellence project has the interesting mix of education and tourism it provides. It consists of a complete tourism package that contains interactive AR-enabled learning modules, narrated stargazing experiences, and creative workshops aimed at different groups: school kids, families, or astronomy buffs. Partnerships with local tour operators, hotels and eco-tourism boosters can also be beneficial since they will help place KUSZA Observatory on the map of astrotourism hotspots. Also, selling astronomy-themed kits, souvenirs, or even making popular educational shows with paid entry will additionally boost revenue streams. Due to its modular structure, the program is flexible and can be tailored for various occasions. The program could expand during meteor showers, eclipses, and other such events with an enormous potential for high footfalls. These unique aspects of the approach guarantee a profitable business with a social purpose, hence appealing to both local and foreign locations.

7. Acknowledgment

The writer would like to take this opportunity to extend the most profound appreciation to the KUSZA Observatory and ESERI staff members for helping and supporting the writer. This study was supported by the Ministry of Higher Education (MoHE) through the Fundamental Research Grant Scheme (FRGS) - FRGS/1/2023/STG07/UNISZA/02/1. Special thanks are dedicated to the Electromagnetic Research Group (EMRG) for their assistance in this work.

8. Authors' Biography



Ahmad Hariz Bely (MA) specializes in Islamic Studies (Astronomy), Radio Astronomy, Observational Astronomy, and Light Pollution. A Bachelor of Syariah graduate, he is pursuing a Master of Science at Universiti Sultan Zainal Abidin. Active in astronomy since 2020 as KASTRO UniSZA President, he has written extensively and serves as an assessor for Al-Hisab Journal at Universitas Muhammadiyah North Sumatra. Winner of the STEM Student Personality Award and Penang Best Innovation Award (2021) for the King Tide product, he volunteers with Dark Sky Malaysia to promote astronomy, particularly in the Borneo region, inspiring enthusiasts and fostering awareness.



Dr. Roslan Umar pursues his Ph.D. degree from Universiti Malaya (UM), Malaysia in the field of Radio Astronomy. His interest in exploring the universe began during his bachelor's degree internship program, when he was assigned to work at the Malaysia National Planetarium. After he finished his M.Sc., Roslan began his academic career at UniSZA and was appointed the Head of Astronomy Unit at UniSZA Observatory. He currently works as a Director and a research fellow at ESERI, UniSZA. Dr. Roslan's research interests are in the field of electromagnetic waves, radio frequency interference, radio astronomy and environmental studies.



Dr. Nor Hazmin Sabri is a faculty member at Universiti Malaysia Terengganu (UMT) specializing in theoretical and computational physics. She earned her Ph.D. from the University of Malaya (UM) and her M.Sc. and B.Sc. from Universiti Kebangsaan Malaysia (UKM). Her research focuses on quantum optics, statistical modeling, and tropical weather effects on telecommunication signals. Prof Madya Ts. Dr. Nor Hazmin has contributed significantly to game-based learning in astronomy education and environmental studies. Actively involved in academic conferences and publications, she is dedicated to advancing physics education and research, fostering innovative approaches within the academic and scientific community.



Ahmad Lutfi Afifi Mohd Nasir (MA) is a researcher UniSZA, Malaysia, specializing in Islamic Astronomy. He focuses on astronomical calculations and moon sighting methods for determining the Islamic lunar calendar. In March 2024, he authored "Hisab Rukyat in the Light of the Quran and Sunnah," published in the Al-Hisab: Journal of Islamic Astronomy. In November 2024, he contributed to "New crescent moon detection using Circular Hough Transform (CHT)" that publish in high impact jurnal which is Astronomy and Computing. His research contributes to the understanding and development of Islamic astronomical practices, aiming to harmonize traditional methods with contemporary scientific approaches.