



# 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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**23<sup>rd</sup> JANUARY 2025  
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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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## **A-ST141: IOT-DRIVEN EGG INCUBATOR WITH EMBRYO MONITORING FOR SMALL-SCALE POULTRY FARMING**

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### **ABSTRACT**

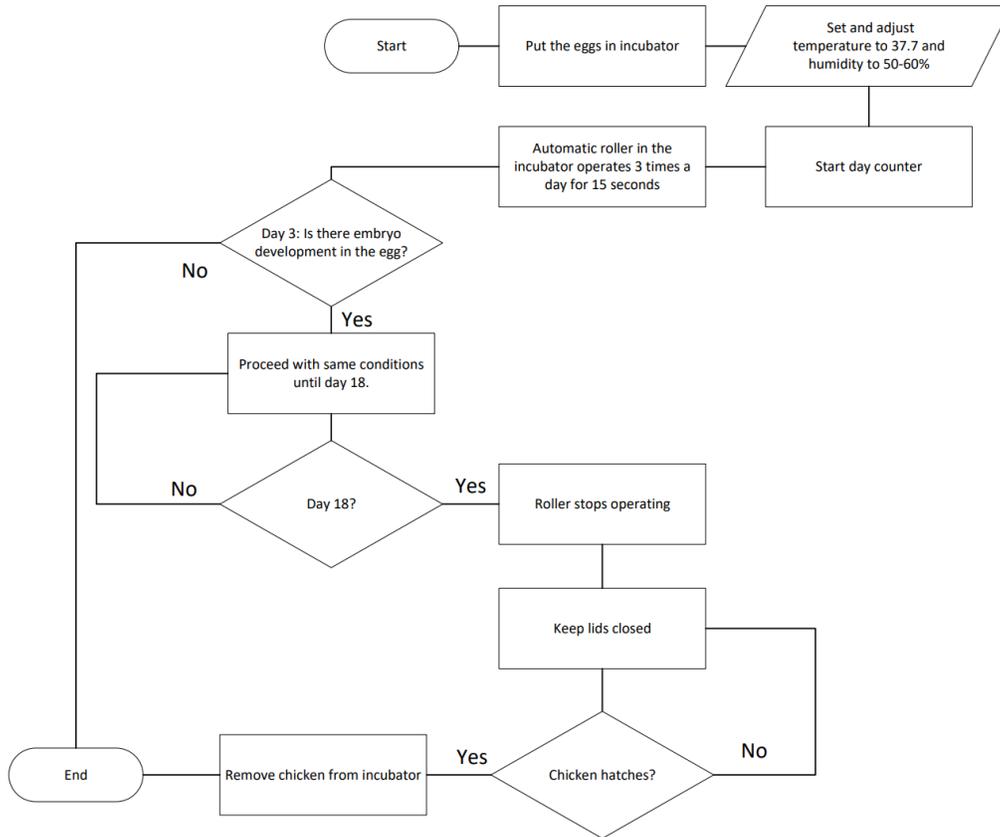
Food security has become a critical national and global concern, prompting individuals to adopt localized solutions to address food insecurity. Small-scale poultry farming, such as backyard chicken farming is one solution to provide families with a sustainable source of protein. This project proposes an electronic incubator designed to automate egg hatching using Internet of Things (IoT) technology. A microcontroller, sensor, cooling fan, and bulb with other supportive components are used to design the incubator. To ensure the hatching process is successful, this incubator is made to control three main parameters, which are temperature, humidity, and egg rotation. The system has the ability to monitor embryo development as early as three days after incubation. Uniquely, the incubator is powered by renewable solar energy, so it reduces reliance on conventional energy sources. The system protects eggs from predators, enhancing hatching success rates and achieving results within 21 days.

**Keywords:** (Food Security, IoT Technology, Electronic Incubator, Solar-Powered System, Backyard Poultry Farming)

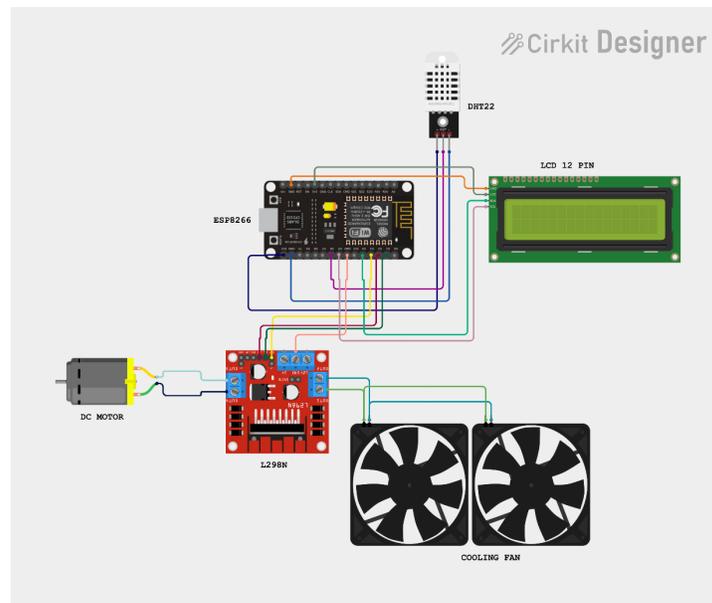
### **1. Product Description**

This electronic incubator simplifies the egg-hatching process by utilizing IoT technology to monitor temperature, humidity, and egg rotation, ensuring optimal hatching conditions. The flowchart in **Figure 1** illustrates the product process. Eggs were put in the incubator, and the temperature was set to 37.7 Celsius, and the humidity range was between 50-60%. On day three, the progress of the embryo will be monitored. If there is no development, the egg will be removed from the incubator. Temperature, humidity, and egg rotation will be kept until day 18. The operation of the roller will be stopped, and the lids of the incubator will be kept closed until the egg hatches. The components of the IoT used in this project are illustrated in **Figure 2**. With a user-friendly interface shown in **Figure 3**, this incubator is ideal for domestic use. Another advantage of this product is solar energy can be used to operate the system.

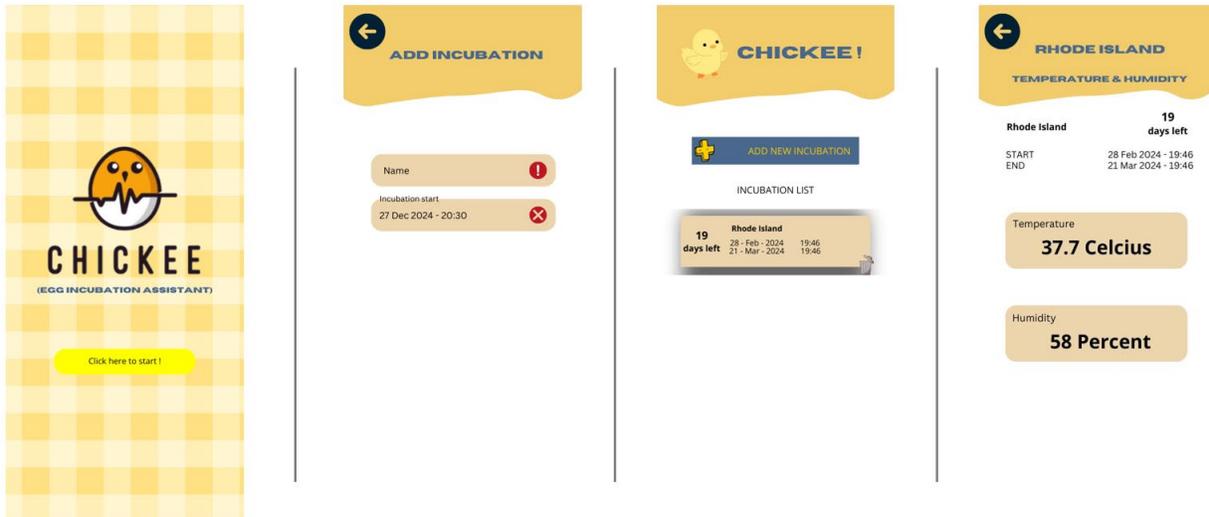
## 2. Flow Chart, Schematic Diagram, and Graphical User Interface (GUI).



**Figure 1.** Flowchart of the process involved in the incubator.



**Figure 2.** The schematic diagram illustrates the IoT components utilized in the development of the incubator.



**Figure 3.** The graphical user interface (GUI) allows users to monitor the egg in the incubator.

### 3. Novelty and uniqueness

The novelty and uniqueness of the incubator are the features to keep track of the embryo's development as early as three days after incubation. This incubator also uses solar energy as a power source, making it more environmentally friendly. Another advantage of this incubator is it protects the eggs from predators such as snakes and foxes. The novelty and uniqueness of the incubator make the success rate of hatching eggs high.

### 4. Benefit to mankind

People with families, especially small farmers, will get benefits from this product. This product gives them the opportunity to raise chickens in their own backyard farming continuously. It helps improve food security by giving families a steady source of protein. The system decreases the need for outside food supplies, promotes self-reliance, and encourages eco-friendly farming methods.

### 5. Innovation and Entrepreneurial Impact

The IoT-driven egg incubator shows how technology can enhance farming practices. It combines IoT technology, renewable energy, and advanced monitoring of embryos all in one device. It's easy to use and can be expanded, making it perfect for local farmers, new businesses, and rural communities. This could help boost economic growth through innovation.

### 6. Potential commercialization

The incubator stands out as an affordable, sustainable solution with unique features, making it an appealing product in the market. The market targets of this product are small-scale poultry farmers, backyard gardening enthusiasts, and rural communities. What sets it apart

is its eco-friendly design and IoT capabilities, catering to a rising interest in sustainable agricultural tools. Commercializing this product could foster local economic growth while supporting global initiatives focused on food security and sustainability.

## 7. Acknowledgment

We are deeply grateful to all those who played a role in the success of this project. Our heartfelt thanks go to the Electrical Engineering Studies, College of Engineering, Universiti Teknologi MARA, Johor Branch, Pasir Gudang Campus, for providing the facilities and a conducive environment that enabled us to successfully complete this project.

## 8. Authors' Biography



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Siti Hajar Al Fatanah Suhaimi is a full-time student, pursuing her bachelor of engineering technology in digital automation at UiTM. She started her primary education at SK Pantai Kundor, Melaka, and continued her secondary school at SMK Seri Tanjong, Melaka. She then completed her matriculation studies at Melaka Matriculation College and is currently in UiTM Pasir Gudang. She is joining a lot of programs to improve her soft and social skills, mainly in electronics.



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Suhaili Beeran Kutty received her Ph.D. in Multimedia Computing from Universiti Putra Malaysia in 2021. She is a senior lecturer at the Electrical Engineering Studies, College of Engineering, Universiti Teknologi MARA, Johor Branch, Pasir Gudang Campus. Her primary areas of research interest encompass multimedia and image processing. She is also a member of the Enabling Internet of Things Technologies (ElioTT) research group at UiTM.