COLLABORATIVE RESEARCH IN ENGINEERING, SCIENCE & TECHNOLOGY

APPLICATION FORM

One (1) softcopy of this form must be submitted to https://cresttgl.uvois.com/e/20221tglgranduni

[Incomplete Applications will not be reviewed]

TEAM INFORMATION

Previous Participation in CREST Talent Event (Please mark ☒):

☒ **Event**
- ☒ 2021 Malaya Makerthon
- ☐ 2021 TGL Summer Workshop
- ☐ 2022 Malaya Makerthon
- ☐ Special Invitation

☐ **Track (Applicable for participants under 2021 TGL Summer Workshop)**
- ☐ Track 1
- ☐ Track 2

DETAILS OF PROJECT LEADER
Name of Project Leader *(as per IC or passport)*: MOHAMMED SAFIR SAEED MOHAMMED
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Year of Study: Third year
The discipline of Study: MECHATRONICS
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E-mail Address: mox.sfs@gmail.com
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DETAILS OF TEAM MEMBER 1
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The discipline of Study: Mechatronics Engineering
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Note: Please delete any extra section of team member details if you have less than five team members.

PROJECT SUPERVISOR INFORMATION
Full Name *(as per IC or passport)*: Ahmad 'Athif Bin Mohd Faudzi
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Faculty/Department: Electrical
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Mailing Address: Centre for Artificial Intelligence And Robotics Universiti Teknologi Malaysia Jalan Sultan Yahya Petra

Note: Please duplicate this section if you have more than 1 Project Supervisor.

PROJECT MONITOR INFORMATION
Full Name *(as per IC or passport)*: Abdallah Osama Hamdan Abdellatif
Position Title in University/Company: Abdallah Osama Hamdan Abdellatif
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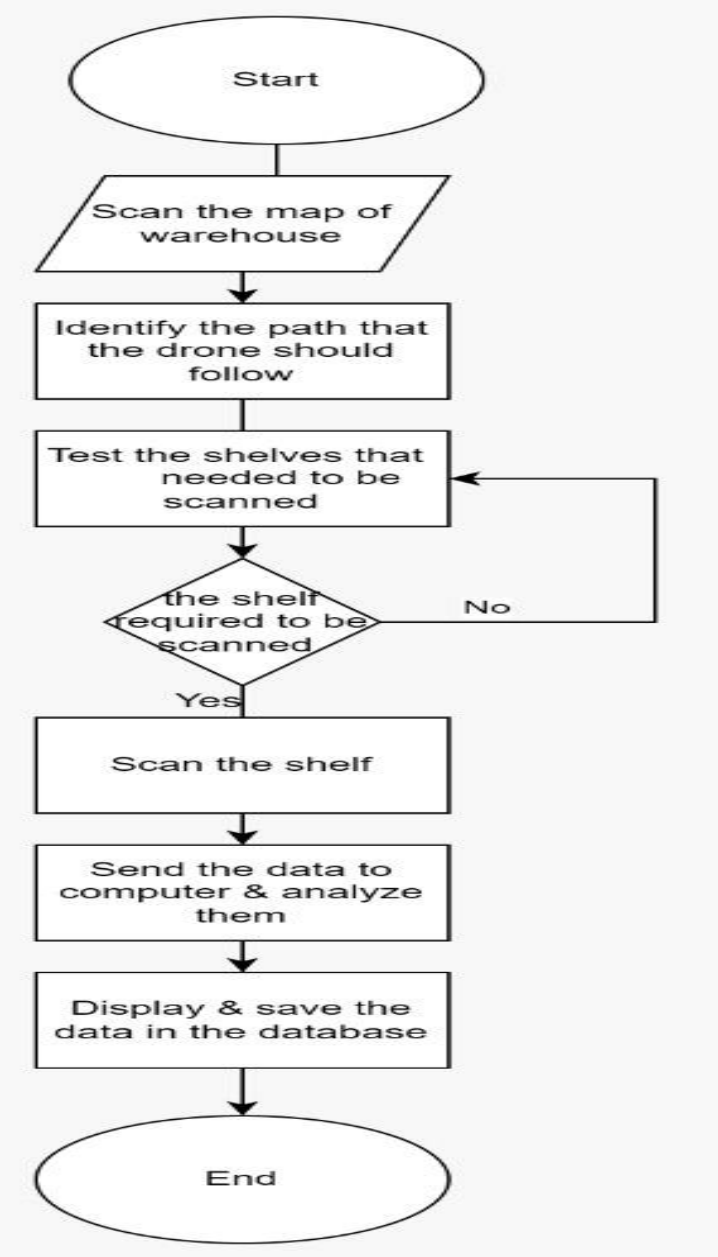
Note: Please duplicate this section if you have more than 1 Project Supervisor.

PROJECT INFORMATION	
A	**Title of proposed project: Drone Scanner for inventory management system**
B	**Executive Summary of Project Proposal (maximum 300 words)** **(Please include a brief explanation of the problem statement and scope of the proposed project)** Inventories management is one of the significant challenges in the industrial field. Optimization of process and utilization of recent technology is needed to ease inventory management. Currently, racks in warehouses can be stacked up to a 12-meter ceiling. As a result, it is impossible to scan inventory QR codes in some warehouses unless forklifts and ladders are used. This may lead to safety risk, time, and human error. In this project, these problems will be addressed using an integrated system consisting of a data collection drone and software to organize this data in a structured way. The framework is expected to perform a QR scan and send the data to the dashboard, where it is analyzed and organized to suit the client, where it can be adopted quickly in their warehouses.

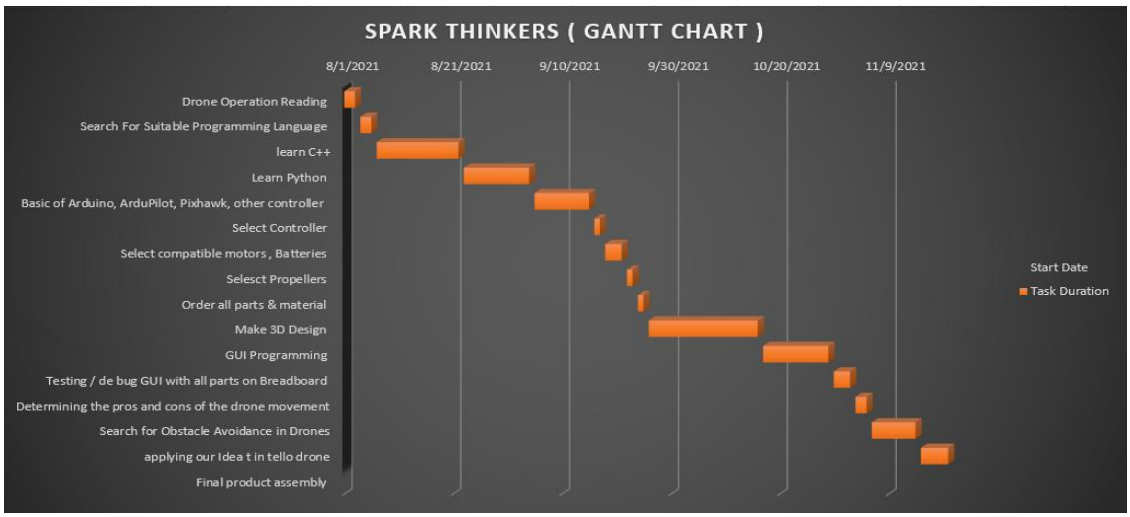
C	**DETAILED PROPOSAL OF PROJECT:**
C(i)	**Project background, including problem statement and research methodology.** Thousands of hours - this is the amount of time that should be spent annually on inventory counting; Inventory management is a time-consuming and labor-intensive procedure that results in increased labor expenses, disruption of operations, and lost earnings owing to inventory, obsolescence, and theft. Increased worker numbers may exacerbate occupational health and safety issues, resulting in millions of dollars annual losses. Warehouses can be piled to a ceiling height of 10 meters in some warehouses, making scanning stock QR codes difficult without the use of forklifts and ladders. Therefore, what if the inventory process were accelerated? The inventory process became cyclical as the condition and number of commodities and products were determined. The data will grow more precise and denser, enabling businesses to focus only on detecting faults and high-risk items. This concept guards against the product are becoming obsolete or stolen. Not only that, but the company also benefits from lower labor and increased revenue. All these issues will be resolved by deploying an integrated system comprised of a drone for data collection and a program to organize the data to utilize and absorb it. It is a thoroughly integrated system deployed in industrial warehouses to aid warehouses in decreasing human labor costs and maximizing the use of available warehouse space by linking it to numerous drones. They are fitted with cameras and sensors to read QR codes on stored items and conduct periodic store inventories. The system is connected to the main plant's control system and the drones stationed in the storage areas. Additionally, the drones are fitted with cameras that enable them to scan and count the quantity and location of objects using the QR up to a distance of ten meters. A comprehensive report on the warehouse's condition can be prepared using real-time data and then submitted to the system, which organizes the data received from the drones and displays it to warehouse management. Algorithms will operate the system, allowing drones to fly at a predetermined time of the month to begin work without putting in much effort or wasting money or time on human labor while also minimizing the percentage of errors

C(ii)	**Objective(s) of the Project** 1) To develop a system where drones scan goods in warehouses 2) To create a dashboard to display the data in a clear way to the user 3) To make the system integrated with the dashboard 4) To evaluate the performance and effectiveness of the project in Real Time
C(iii)	**Proposed Project Plan (by weekly basis)** 1. Project Scope Our prototype can perform some warehouse operations really well even though they don't have the ability to choose and place. These operations include cycle counting, inventory counting, and inventory management. By using drones to scan Qr and avoid using forklifts for this purpose, warehouses can save energy. Additionally, drones help avoid the inherent safety risks associated with lifting humans to a high level from shelves to scan barcodes. Our project will be in storage warehouses. It includes scanning of QR and bar code. You will be using TELLO Drone as a prototype to do the work required. There are some limitations we have, for example, the need for a warehouse map and tank details to make our project work in the chosen place.

2. Flow Chart of Project Activities (Please enclose in the Appendix as appropriate)



3. Gantt Chart of Project Activities including Milestones and Dates (Please enclose in the Appendix as appropriate)



4. Human Resources Plan (Team composition, roles, responsibilities, etc.)

Name of Members	**University**	**Roles**	**Responsibilities**
Mohamed Safir	UTM	Team Leader	Oversee and manage the project
Mohamed Abu Jarad	UTM	Developer	Researching, designing, implementing, and managing software programs.
Omar Batis	UTM	Solution Architect	Solution Analysis, Technical Design approval, Code Reviews
Mohamed Magdy	UTM	Marketing Head	Oversee the implementation of the marketing strategy
Mahmoud Atwa	UTM	Technical Lead	Requirements approval, Technical Design, Solution Development & Delivery

C(iv) **Expected Outcome of the Project**

1. Describe the Technology Readiness Level of the output. Please select one of the boxes below.

   ☒ Prototype ready for demonstration in an appropriate operational environment
   ☐ System/subsystem model or prototype demonstration in a simulated environment

Detailed Explanation of the Expected Outcome

The goal or expected outcome of our revolutionary solution and a faster one for inventory management system is that:

The drone raises a barcode scanner to the highest shelves and methodically moves down or sideways on the lanes between rows by scanning the barcodes from pallets; meanwhile, the operator receives direct feedback. A live video stream allows the operator to inspect the status of the products or check the contents of the pallets. Photo and video images can then be associated with the scanned items in the offline viewing database. In addition, pictures and video footage can be uploaded to the server for later retrieval and reporting purposes. The simplicity of our system involves low costs with the infrastructure required to inventory a warehouse.
The only requirement is to upload a file with the warehouse stock to the system database and prepare the drone with the associated scanner. After or during scanning, reports and files can be generated and sent directly to the back offline or uploaded to the warehouse management system (WMS).

C(v) **Marketability Aspect**

Marketing plan:
Our project will target factories, production lines, and large and emerging warehouses. The marketing strategy depends entirely on the way the product is presented. We will make the drone with capabilities commensurate with its practical function in the factory, so there is no need to make it more expensive. And three types can be produced according to the size of the factory for the giant factories.

The drone can be made with more energy and lasts for a more extended period, and its ability to rise and greater efficiency. Compared to the other two types thus, we can provide a product that can suit the customer's need and the WMS offer and the software that we provide with the drone, which will be flexible and usable for various factories and warehouses. The price of this product can be estimated at approximately $ 1,000-5,000.

D **Bill of Materials and Budget**

Bill of materials:

1 Tello drone	450 RM

Please indicate your estimated budget for this project as below.

i.

No.	Raw Materials/Components	Cost (RM)
1	DIY drone including (frame,props,motors,and wires)	650
2	Pixhawk	446
3	Nvidia Jetson nano	605
4	Intel Realsense depth camera	2,109
5	IMU 9-DOF sensor	200

ii.

No.	Equipment/Software	Indicate Purchase /Rental	Cost (RM)
1			
2			
3			
4			

TOTAL COST : RM4010

Note:

(1) If any project materials, equipment, software, or other project items are sponsored/contributed by any party/parties or already owned by project team members/universities/schools, please list the item and specify the cost as **SPONSORED** ..(by whom).

F	**Declaration by applicant** **(Please tick *(√)*):**

	I at this moment declare that: ☒ **1.** All information stated here is accurate. CREST has the right to reject or cancel the offer without prior notice if any inaccurate information is given. ☒ **2.** Signed PDPA Consent Forms for every team member are attached to this application. **Date: 03/02/2022** **Project Leader's Signature :**

Note:
Application submitted will be treated in complete confidence. The award decision is final.

CHECKLIST FOR CREST THE GREAT LAB (TGL) GRAND DESIGN CHALLENGE APPLICATION FORM

1) One (1) set of softcopy CREST TGL Grand Design Challenge Application Form ☒
2) Detailed Project Proposal (in Powerpoint) ☒
3) CREST PDPA Consent form for every project team member ☒
4) Resume of Project Team Members ☒
5) Copy of University Student ID Matrix Card of every project Team members ☒