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**THE UNIVERSITY OF HONG KONG  
FACULTY OF ENGINEERING  
INNOVATION ACADEMY**

**Application for the Funding Scheme for student projects/activities  
by Tam Wing Fan Innovation Fund and Philomathia Foundation Innovation Fund**

*Applications and the supporting documents should reach the Innovation Academy by October 13, 2023 (Friday).*

## A. Project profile

<b>Project Information</b>						
<b>Project title:</b>		Smart Wheel Chair				
<b>Hosting Department in the Faculty of Engineering (if applicable):</b>		Department of Mechanical Engineering				
<b>Category:</b>		Please check the box(es) below if the project covers the related area(s):  <input checked="" type="checkbox"/> Development of projects/activities <input checked="" type="checkbox"/> Participation in approved competitions, visits and conferences <input type="checkbox"/> Attachment to university and institutes / centres (Mainland and overseas); laboratories and enterprises (local, Mainland and overseas) <input type="checkbox"/> Promotion of STEM / Innovation in the community <input type="checkbox"/> Others (Please specify: _____)				
<b>Expected start date:</b>		November 1, 2023				
<b>Expected end date:</b>		March 1, 2024				
<b>Supervisor(s) / Advisor(s)</b>						
#	Department	Title	Name	Phone number	Email	
1.	Mechanical Engineering	Assistant Professor	Dr. Peng LU	+852 3910 2548	lupeng@hku.hk	
<b>Team members</b>						
#	Role (e.g. leader / member etc.)	Name	Curriculum (Year)	Phone number	Email	Student ID
1.	Leader	KANG Jian	MPHIL(1)	51937066	u3597147@connect.hku.hk	3035971478
2.	Member	Zhang Zihan	MSC(1)	56981067	u3619457@connect.hku.hk	3036194572
<b>Project summary (About 500-600 words.)</b>						
<p><b>(a) Objectives:</b></p> <p>The contribution of an autonomous wheelchair to society is multifaceted. It provides individuals with mobility challenges the ability to move independently and participate more fully in society, offering the following benefits:</p> <p>Promoting personal independence: An autonomous wheelchair enables individuals with mobility limitations to engage in daily activities with greater independence. They no longer depend on others for assistance and can</p>						

autonomously navigate to destinations such as shopping malls, parks, hospitals, and more. This autonomy is crucial for improving their quality of life and self-esteem.

Enhancing social inclusion: Individuals with mobility challenges often face social isolation and exclusion. An autonomous wheelchair helps them integrate into society more effectively, enabling face-to-face interactions and social engagement. They can participate in community activities and social gatherings, establish more social connections, and reduce the negative impact of social isolation.

Improving transportation efficiency: Autonomous wheelchairs incorporate intelligent navigation and obstacle avoidance capabilities, allowing for efficient route planning and obstacle avoidance. This reduces the need for manual wheelchair propulsion, alleviating the burden on caregivers and enabling better adaptation to traffic flow in busy environments.

Promoting sustainable development: Autonomous wheelchairs typically employ electric propulsion, reducing reliance on traditional fuels and decreasing environmental pollution and carbon emissions. This contributes to sustainable development and raises awareness of environmental conservation.

And this work will also take part in the humanity competition held by Debi this December.

#### **(b) Contribution to out-of-classroom learning in the team and Innovation Wing:**

Learning how to build an electric wheelchair offers several benefits to students in terms of enhancing their AI programming skills, mechanical design abilities, mechanical machining capabilities, programming skills, and fostering a sense of social responsibility:

Improving AI programming skills: Electric wheelchairs often utilize advanced artificial intelligence technologies for autonomous navigation and obstacle avoidance.

Enhancing mechanical design abilities: The design of an electric wheelchair involves knowledge of mechanical structures, kinematics, and dynamics.

Developing mechanical machining capabilities: Building an electric wheelchair requires machining and assembling various components. Students can learn and practice mechanical machining techniques such as cutting, milling, welding, etc.

Enhancing programming skills: The control system of an electric wheelchair typically employs embedded programming to achieve various functions and interactions.

Fostering a sense of social responsibility: Building an electric wheelchair is closely related to providing a social service. By learning how to build an electric wheelchair, students gain a deeper understanding of the needs of individuals with mobility challenges and can use their expertise and skills to improve and address related issues.

#### **(c) Relationship to technology application/development of the project:**

Practical opportunities: The electric wheelchair project provides students with practical project opportunities. They can participate in the design, manufacturing, and improvement of electric wheelchairs, learning and applying relevant engineering knowledge and skills.

## **B. Deliverables of the Project**

1. Mechanical structure optimization

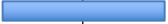



2. Control framework

3. Improve the dynamic obstacle avoidance ability

4. Attend Prototypes For Humanity held by Dubai

### C. Execution Plan *(In the form of timeline chart.)*

(For example)

	1 <sup>st</sup> week	2 <sup>nd</sup> Week	3 <sup>rd</sup> Week	4 <sup>th</sup> Week	5 <sup>th</sup> week	6 <sup>th</sup> week	7 <sup>th</sup> week	8 <sup>th</sup> Week	9 <sup>th</sup> Week	10 <sup>th</sup> Week	11 <sup>th</sup> Week	12 <sup>th</sup> month Week
Mechanical structure optimization												
Control framework												
Improve the dynamic obstacle avoidance ability												
Attend Prototypes For Humanity held by Dubai												

## D. Funding request

- The funding request **should normally cover the period from December 1, 2023 to November 30, 2024** and should be clearly stated in the following table with detailed justifications.
- Applicants are advised to observe the terms and conditions as stated on the “General Application Guidelines for Funding Scheme for student projects/activities by Tam Wing Fan Innovation Fund and Philomathia Foundation Innovation Fund”.
- Please attach **a full budget proposal of your project** with this application and submit to the Innovation Academy.

	Item	Detailed specification	Estimated Amount (HK\$)	For office use only
<b>A. Equipment</b>				
1	On board computer	Intel NUC 13 Pro Kit - NUC13ANHi7 ( i7-1360P、DDR4 x2 、 Thunderbolt 4 x2 )	5,699.00	
2	3D Lidar	Stereo-Sensing Hybrid Solid-State LiDAR	3,000.00	
3	Motor	High Performance motor	1,200.00	
4	Deep camera	82635AWGDVKPMP	2,000.00	
5				
<b>B. Consumables and other expenses</b>				
1	Glass fiber	Largest size capable of water jet cutting in innowing	2,300.00	
2	Carbon fiber	Largest size capable of water jet cutting in innowing	3,000.00	
3	Aluminum profile	40mmx40mm	1,000.00	
4	Aluminum tube	Different type	2,000.0	
5				
<b>C. Subsidy for student travel and accommodation</b>				
1	Air Fare tickets	For 2 people	9,000	
2	Accommodation	For 2 people	9,000	
3	Transport in Dubai	Bus,	1,000	
4				
5				
<b>Total funding request to this scheme:</b>			<b>30199.00</b>	
<b>Total budget:</b>			<b>31000.00</b>	
<i>Other information:</i>				
<b>Other funding source(s):</b>				
<i>Please indicate the total funding from alternative sources (such as the HKUEAA Experiential Learning Fund, Centenary Scholarship Fund Student Experiential Learning Activities, HKU Gallant Ho Experiential Learning Fund, departmental funding, etc.)</i>				
	<b>Funding source</b>	<b>Amount</b>	<b>Status</b>	
1			<input type="checkbox"/> Application submitted <input type="checkbox"/> Application approved. <input type="checkbox"/> Others: _____	

2			<input type="checkbox"/> Application submitted <input type="checkbox"/> Application approved. <input type="checkbox"/> Others: _____
3			<input type="checkbox"/> Application submitted <input type="checkbox"/> Application approved. <input type="checkbox"/> Others: _____


## E. Submission and endorsement

☐ I acknowledge that there are required project deliverables for the Faculty funding. I shall submit timely by the end of the project or each academic year:

- Media links:
  - **Poster** - 36 inches width \* 54 inches height with 150dpi (5,400 \* 8,100 pixels)
  - **Images** - including one cover image and at least 5 project images in printable quality.
  - **Video** – a one-minute video for publicity purpose
- A project completion report
- A written student sharing from each team member
- **Acknowledgement of support of the Faculty of Engineering and the respective funding source(s) on the poster, images, videos, written reports or other written publications.**

☐ I understand that there will be events/visiting tours arranged by the Innovation Academy and/or Tam Wing Fan Innovation Wing. The Supervisor/Advisor (or student/staff assigned by the Supervisor/Advisor) will help to introduce the projects to visitors upon requests made by the Innovation Academy and/or Tam Wing Fan Innovation Wing.

☐ I acknowledge that should there be any deviation in the implementation of the proposed project after funding approval, I shall timely inform the Innovation Academy for endorsement.

	Applicant	Supervisor / Advisor	Head of the Hosting Department (if applicable)
Signature:			
Name:	Zhang Zihan	LU Peng	
Department:	ME	ME	
Date:	13-10-2023	13-10-2023	

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<input type="checkbox"/>	<b>Approved</b>	Equipment		HK\$
		Consumables & other expenses		HK\$
		Students' travel & accommodation		HK\$
Remarks:				
<input type="checkbox"/>	<b>Disapproved</b>			
Remarks:				

**Endorsed by**

\_\_\_\_\_  
Director of Tam Wing Fan Innovation Wing,  
Faculty of Engineering, HKU

**Date:**

**Endorsed by**

\_\_\_\_\_  
Head of Innovation Academy,  
Faculty of Engineering, HKU

**Date:**