

Executive Summary Final Results

“EV Hackathon: Future EV Mobility Creative Contest for Sustainability”

To commemorate the 160th anniversary of Thai-German diplomatic relations

Co-organized by Department of Europe under Ministry of Foreign Affairs,

Embassy of Germany in Thailand, and KMUTNB

On August 27-28, 2022, at KMUTNB

<https://ev4sustain.kmutnb.ac.th/>

To mark the 160th anniversary of the diplomatic relations between the Kingdom of Thailand and the Federal Republic of Germany, the Department of European Affairs under the Ministry of Foreign Affairs, the German Embassy in Bangkok and King Mongkut's University of Technology North Bangkok co-organized a tripartite event “EV Hackathon: Future EV Mobility Creative Contest for Sustainability.” The key aims and objectives of the competition are to enhance awareness among the public on amicable relations between the two countries as well as to contribute to the society.

Out of 101 teams attending the contest, 8 teams advanced to the final round of 21-hour EV Hackathon. The issue to solve is to “Invent solution of sustainability in Bangkok Metropolis with EV Mobility Technology” assigned by Royal Thai Embassy in Berlin, Germany. The underlying reason lies in the fact that Bangkok has grown rapidly without a clear city planning, which leads to so-called “superblocks”. This generates social inequalities in transportation, quality of life, accessing healthcare services and maintaining safety.

EV Hackathon achieved attention and support from public and private institutions as follows:

- Porsche Thailand, AAS Auto Import Co. Ltd.
- The Metropolitan Electricity Authority (MEA)
- Schaeffler Manufacturing (Thailand) Co., Ltd.
- Electricity Generating Authority of Thailand (EGAT)
- Covestro (Thailand) Co., Ltd.
- Symphony Communication Public Co., Ltd.
- Robert Bosch Automotive Technologies (Thailand) Co., Ltd.
- QTC Energy Public Co., Ltd.
- Mercedes-Benz (Thailand) Ltd.
- BMW Manufacturing (Thailand) Co., Ltd.
- B. Grimm Power Public Co., Ltd.
- KMUTNB Alumni Association under the Royal Patronage of His Majesty the King
- Bangchak Corporation Public Co., Ltd.
- TÜV Rheinland Thailand Ltd.
- SCG Foundation
- LAMY Thailand
- Siemens Limited
- Boon Rawd Brewery Co.,Ltd.

In-kind contributions and cash amounting to 1,510,855.00 baht was donated to the project. After deducting operating expenses, the remaining budget will be further used for the University's R&D in relation to modern automobile technology.

Judging Criteria:

1. Creativity, impactful presentation and communication skills
2. Technical accuracy and practicality
3. Positive impacts on economic, social and environmental sustainability

Work titles of the final 8 teams:

Team	Work Title	Affiliation
Thunder EV	Thunder Taxi	Chulalongkorn University
CHARGEGEN	SALA	Chulalongkorn University
Wagen Toretto	ELFIN (Electric-micro Mobility for Easy Life)	Chulalongkorn University
EVT	SgoodBus	King Mongkut's Institute of Technology Ladkrabang
PorMayJedai	KMUTNB Route	King Mongkut's University of Technology North Bangkok
KUXEV	ICE to EV conversion center	Kasetsart University
Bangmod	RIDE	King Mongkut's University of Technology Thonburi
ACDC	Electric Kapor	Chulalongkorn University

Final Round Result Announcement:

The grand prize winner, winning a 100,000-Baht cash prize

ACDC from Chulalongkorn University, with team members:

- Mr. Chanon Wanasinchai
- Mr. Natthawat Piyanonthaya
- Mr. Korpoj Piya-asdarat

The first-runner up, winning a 50,000-Baht cash prize

PorMayJedai from King Mongkut's University of Technology North Bangkok, with members:

- Ms. Metinee Thuleerat
- Ms. Por-ngern Suksai
- Mr. Pakapon Chaimongkoltrakul

The second-runner up, winning a 25,000-Baht cash prize

Bangmod from King Mongkut's University of Technology Thonburi, with team members:

- Ms. Kawisara Sripattanatrakul
- Ms. Ratchadaporn Boonrungsee
- Mr. Supachit Coomsiripituck

Five honorable mention teams, winning a 15,000-Baht cash prize each:

1. Wagen Toretto from Chulalongkorn University, with team members:
 - Mr. Kittibhum Potong
 - Mr. Guy Yotsaksri
 - Mr. Witsathon Pongkapanakrai

2. EVT from King Mongkut's Institute of Technology Ladkrabang, with team members:
 - Mr. Thapanon Noochan
 - Mr. Ittikorn Tipson
 - Ms. Poonwisa Borvonshivabhumi

3. CHARGEGEN from Chulalongkorn University, with team members:
 - Ms. Hathaitanit Tongthong
 - Mr. Patthanapol Tanaboriboon
 - Mr. Watcharapong Wongkaew

4. KUXEV from Kasetsart University, with team members:
 - Mr. Kun Lerttanaaree
 - Mr. Lor Techeen Bhumithadadech
 - Ms. Natsuda Uppapong

5. Thunder EV from Chulalongkorn University, with team members:
 - Mr. Dechatorn Devaphalin
 - Mr. Chaiyapat Boonyaratsiri
 - Mr. Poom Kraesai

A lucky draw among the final list of 24 contestants:

The prize contains round-trip airfare and accommodation to Germany and visiting Battery Testing Center opened by TÜV in Germany

Winners of the lucky draw:

Mr. Chanon Wanasinchai, ACDC team member from Chulalongkorn University

**Presentation of the first prize winner: ACDC,
from Chulalongkorn University**

Team members:

- Mr. Chanon Wanasinchai
- Mr. Korpoj Piya-asdarat
- Mr. Natthawat Piyanonthaya

Work title: Introducing Sustainability in Urban Development with EV Mobility Technology: Electric Kapor

Review:

The proposal to solve transport problems in Ladprao Superblock area involves the adaptation of Thailand's Kapor mini truck into an electric Kapor. The use of AI assists in locating the shortest path distance to connect to the public transit system in the area. The solution aims to avoid traffic congestion in Bangkok's high-density superblock areas. The uniqueness covers all-round information in addition to suggested solutions from economic and sociological perspectives, e.g. cost efficiency comparison and offering a compromise agreement with the original mini truck driver service providers.

Observations:

1. Good preparation: Superblock scenarios in Ladprao were selected with key information, including population number, community spaces, population density per sq. km, and availability of the public transportation in the area.
2. The team applied a decentralized approach to find the shortest path between the starting point and the destination, which might differ from mass transit's conventional routes. Artificial Intelligence applications would help users find the optimal routes that connect to the original route while avoiding motor traffic congestion.
3. The ACDC team proposed a modified Kapor mini truck, of which the redesigned platform could support motor, battery power packs and charging systems.
4. Passenger fare were illustrated for comparison, including fares of Bangkok's motorcycle taxis, Grab taxis and city buses ranging from short to long distances. The compromise usage of Kapor as an alternative transport over a short distance for approaching a mass transit network would not affect the career of traditional chauffeurs and taxi driver service providers.
5. A step-by-step presentation facilitated understanding. The presenters were able to answer questions using a logic and rational process.

**Presentation of the first-runner up: PorMayJedai
from King Mongkut's University of Technology North Bangkok**

Team members:

- Ms. Metinee Thuleerat
- Ms. Por-ngern Suksai
- Mr. Pakapon Chaimongkoltrakul

Work title: KMUTNB Route

Review:

The work is a proposal to solve university student challenges of commuting during the heaviest traffic flow periods in areas in proximity to KMUTNB. The solutions encompass the use of e-scooters in combination with the public transport e-shuttle bus. The design of e-shuttle bus pick-up points and drive cycles are offered using local demographic information. Electric scooter rental application software facilitates e-scooter bookings and rental. The app also displays parking stations and necessary action plans are indicated, including accident insurance, incident reporting, and comprehensive management of Control Center.

Observations:

1. The team proposed a solution for commuting challenges during the morning peak time when KMUTNB students needed to get to the university. The morning traffic congestion along the way began from the MRT station area. The team offered two options: the e-shuttle bus model along two routes coupled with the e-scooter mode for further connection to the e-shuttle bus services, or users could opt to ride an electric scooter directly to the campus.
2. Designated e-shuttle stops were conveniently located across the areas surrounded by the superblocks. Connectivity in superblock networks could allow residents to access to the stops from dwellings within the same duration.
3. The number of e-shuttle buses, driving cycles and bus times were properly calculated, i.e. in the morning time, by 10:30 am.
4. Mobile app for e-scooter booking and rentals was suggested. The locations of scooter stations were exposed for increased convenience perceptions.
5. Essential marketing plans were offered, comprising electric scooter accidental insurance, charging stations, and notifications in the event of e-scooter-related injuries.
6. Advantages due to usage of electric scooters during rush hour were clearly demonstrated.

**Presentation of the second-runner up: Bangmod Team
from King Mongkut's University of Technology Thonburi,**

Team members:

- Ms. Kawisara Sripattanatrakul
- Ms. Ratchadaporn Boonrungsee
- Mr. Supachit Coomsiripituck

Work title: RIDE

Review:

The work features a proposal to solve the challenges experienced by those who travel in the neighboring area around King Mongkut's University of Technology Thonburi using EV motorbikes. Electric motorcycle rental delivers a convenient transportation option to local residents. Designated parking spaces are located along the public transportation routes and at the center of superblocks. The project proposes a Motorbike Rental mobile app to manage EV motorbike reservations and rentals. The app can be used to search for the nearest charging stations. The presentation contains a general overview of a business plan, including earning income from electric motorbike rental service and battery replacement. Incentives, incorporating a variety of rental packages and special discounts are proposed to attract new customers.

Observations:

1. The presentation involved an electric motorcycle rental service for residents living inside the superblock in the areas in proximity to King Mongkut's University of Technology Thonburi (KMUTT). Commuting to university would be more convenient. Parking spaces were located along the public transport routes.
2. An additional EV Motorbike rental point was set up in the middle of the superblock area to support the residents wishing to avoid busy street walk.
3. Software application was proposed as a platform for managing e-motorbike booking and rentals. Information about EV charging stations was available on the app. Users could rapidly search for the nearest charging spots in case of insufficient battery power.
4. A business plan was proposed for earning income from EV-motorbike rentals and battery replacement. Different packages covered weekly, daily, and hourly rental periods, whereas rental discount campaigns seemed to help attract more customers to the business.
