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## Science, Technology, Research and Innovation for Development (STRIDE)



### Brushed/Brushless DC Motor Controller and Battery Management System with Battery Authentication for Electric Vehicles

**GRANTEE:** University of the Philippines Diliman (UPD)

**PRINCIPAL INVESTIGATOR1:** Engr. Gaudan Albert Chekov L. Castillo

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**CONTRACT AMOUNT:** Php 999,600 (approximately USD21,300)

#### Green transportation goes local

Hundreds of thousands of public vehicles such as tricycles, jeepneys, and buses as well as privately owned cars plying major thoroughfares daily contribute to the deterioration of air quality or exacerbate air pollution in the Philippines. Electric vehicles are more energy efficient, cheaper to operate, and are more environmentally friendly due to the absence of emissions. Thus, in the last few years, the Philippine government, through the Department of Energy and Department of Science and Technology, has been pushing for the adoption of electric vehicles (EVs) as alternatives to internal combustion engine vehicles for public transportation.



*Prototype of the electric tricycle*

While the idea is certainly beneficial to transport providers and commuters or the general public, technological barriers to implementation impede adoption. Early adopters such as the cities of Puerto Princesa in Palawan and Mandaluyong failed to maintain their fleet of EVs and in less than 2 years, most if not all fell into disrepair. Even private individuals who opted to try the technology experience the same challenges.

In all these cases, the failure to maintain these investments can be attributed to limited knowledge of the technology, non-availability of spare parts, and the lack of local technical support.

To enable the mass adoption of EVs, there is a need to boost local knowledge of EV technologies, train local experts and technicians, minimize the need for foreign technologies, and lower the costs of ownership and maintenance.

To do all this, a research team from UPD, with assistance from USAID STRIDE, is developing locally designed electronics for EVs. The components of an EV include the following:

- Motor driver for the vehicle's power train;
- Battery management system to ensure the safe operation of the batteries and to maximize their useful life; and
- A method to authenticate the battery through the motor controller to promote the battery swapping business for EVs.



*Engr. Gaudan Albert Chekov Castillo, presents to STRIDE the components of the brushed/brushless DC motor controller and battery management system with battery authentication for electric vehicles*

### **Potential application and benefits**

Once the project succeeds, the local EV industry will take off, with the following among the expected results:

- Lower cost of ownership and maintenance;
- Increased net profits for public transport groups;
- Lower cost of repair and maintenance with better access to technical support; and
- Lower risk of starting and operating EVs and more opportunities in the battery swapping business.

The mass adoption of EVs on a national scale could save up to 28 million barrels of oil or USD3.7 million at USD130 per barrel. At the same time, it will address pressing concerns regarding air pollution.