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作品編號	100032
參展科別	工程學
作品名稱	<b>Construction of an Emergency Portable Dynamo Mobile Phone Charging Station by Means of a Hand-Crank Gear Mechanism/ Solar Panels</b>
得獎獎項	四等獎
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## **Abstract**

The researchers aim to construct an emergency mobile phone charging station that runs on renewable energy and will serve as a cost-efficient alternative to more traditional power banks. Circuit components include a 20V / 6W solar panel supplemented by a hand-crank gear mechanism integrated with a 6V / 1A lead-acid battery, a usb output and an adjustable switch-mode power supply (SMPS) to convert excess voltage into current. Initial voltage and current outputs were measured under varying resistances. It was determined that the set-up satisfied the minimum voltage and current requirement for charging a mobile phone (5V / 1A). A subsequent phone charging test was executed using a Samsung Galaxy J2 (3.85V Li-ion battery 7.70W, Charge Voltage: 4.4V / 2000mAh) wherein it charged on an average of 0.277% per minute for the solar panel and an average of 0.263% per minute for the hand crank gear mechanism. A Mann-Whitney U statistical test was conducted to determine if the charging rate of the charging station had a significant difference from a commercially available power bank's. The calculated UA: (4) from the test was below the lower limit and the UB: (217) was above the upper limit which indicated that there was a significant difference between the charging rates. While the efficiency was lower than the commercial power bank's, it can still be used as an alternative charging method especially during emergencies and disasters.

## 【評語】 100032

1. The project is aimed to use hand-crank gear or/ and solar panels to provide electric charging for mobile phone in emergency situation.
2. The demo and results are encouraging.
3. It is suggested that efficiency and system optimization should be conducted in the future study.