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Using of Vehicle Movement to Overcome Running Out of Mobile Phone Batteries Problems

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استخدام حركة السيارات للحيلولة دون نفاد بطاريات الهواتف المحمولة

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Abstract:
How many times have you been exposed to an embarrassing situation or missed an opportunity, a prize or an important meeting because of your phone ran out of charge and you was not able to find an electric source or a suitable plug.
As being fed up with mobile dead batteries, and as a part of the System Design Course projects taught to the third year, Faculty of Applied Arts, Beni-Suef University, Department of Industrial Design students, a team consisting of, Engy Deya William and Mohamed Khaled Mohamed, under supervision of the researcher, thought about an idea that could harness the gust of wind or aerodynamic drag resulting from a moving vehicle and the way of using the resulting, renewable source of electric energy in recharging mobile phone batteries.
An experiment was conducted on a prototype and concluded that as a 20 km/h moving vehicle has the ability to generate about 3 volts, 50 mA measured by the use of a Multi-meter, and the amount of electrical energy generated is directly proportional to the speed of the vehicle, the proposed design idea is fully suitable for daily life activities and within city roads, but it may need further study to ensure its suitability on highways and at high speeds.
Keywords: Wind energy; Wind Gusts; Wind Harnessing; Miniature Turbines; Renewable Energy.

الملخص
كم من المرات تعرضت لأحد المواقف المحرجة أو فاتتك إحدى الفرص أو الجوائز أو الاجتماعات المهمة بسبب نفاد شحن هاتفك عدم تمكنك من العثور على مصدر للكهرباء أو قابس مناسب.
فى ظل السأم من بطاريات الهواتف المحمولة الميتة، وضمن مشروعات تصميم النظم و التى يتم تدريسها لطالبات و طلاب الفرقة الثالثة بكلية الفنون التطبيقية جامعة بني سويف، قسم التصميم الصناعي، فكر فريق عمل مكون من، إنجي ضياء وليم و محمد خالد محمد و تحت إشراف الباحث مدى إمكانية استغلال قوة الرياح أو السحب الهوائي الناتج عن تحرك المركبات كيفية استخدام هذا المصدر من مصادر الطاقة الكهربية المتجددة في إعادة شحن بطاريات الهاتف المحمول.
وبإجراء تجربة عملية على نموذج أولي تبين أنه لدى المركبة أو السيارة التي تسير بسرعة 20 كم/ساعة القدرة على توليد حوالي 3 فولت 50 مللي أمبير والتي تم قياسها باستخدام جهاز Multi-meter، كما تبين تناسب كمية الطاقة الكهربائية المتولدة بشكل طردي مع سرعة المركبة، لذا فقد تبين ملاءمة فكرة التصميم المقترحة لأنشطة الحياة اليومية و في الطرقات داخل المدينة، و لكنها قد تحتاج إلى مزيد من الدراسة للتأكد من مدى ملاءمتها للاستخدام على الطرق السريعة و في السرعات العالية.
الكلمات المفتاحية: طاقة الرياح، الطاقة المتجددة، هبات أو نسمات الرياح، التوربينات المصغرة، تسخير الرياح.

Introduction

Over the years, wind energy has been harnessed to help carry out many tasks in order to serve and delight humanity, such as sailing of ships, grinding of grains, raising of water from wells and springs, nearly starting from

the invented wind mill by Hero of Alexandria as shown in figure (1) . By the 18th century European windmills were firstly used in addition to the generation of electricity. [3]

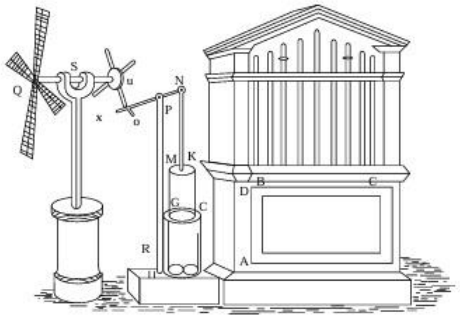

Figure 1: Hero's Windmill.

The sizes of windmills or turbines and the materials used in their manufacture varied depending on the purpose for which they are used or the function assigned to them as shown in Figure 2 [11]

Figure 2: Different forms and purposes of wind turbines.

Materials and Methodology:

Due to the great scientific progress, the huge leaps in material science and technology, and the emergence of plastics, alloys, composite and synthetic materials, it has become possible to manufacture larger and lighter turbines that have a greater ability to generate electricity as shown in Figure (3).

Figure 3: Some workers standing inside a giant wind turbine blade.

It has even become possible to manufacture miniature turbines from composite plastic materials to invest the minimum amount of wind energy in the generation of electricity.

Figure 4: Best design award 2006 wind power bike lamp [10].

During the last several years, some small lighting units have appeared that can be mounted on bicycles as shown in figures (4, 5, 6 and 7), in which the air or wind gust resulting from the movement of the bicycle can be exploited and converted into electrical energy relying on Faraday's electromagnetic induction principle, by placing an electromagnetic inductor inside a micro wind generator. [2] [4] [5]

Figure 5: International Design Competition 2013 Winners Wind power Bicycle Lamp [6]

Figure 6: YANKO DESIGN Wind power bike lamp [8]

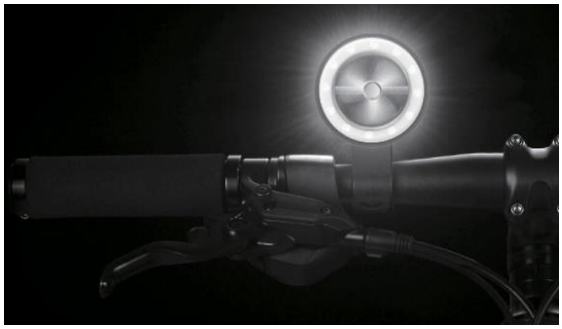

Figure (7): Red-dot design award 2018 winner wind power bike lamp [7]

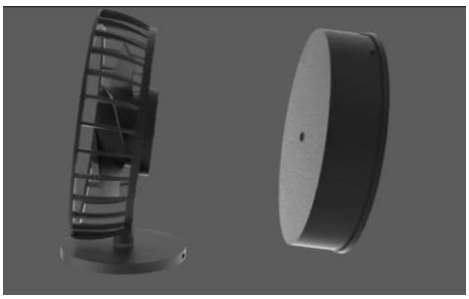

Figure (8): The front and back part of the implemented unit.

The resulting electric power is stored in a rechargeable lithium battery, and then used in lighting of the led lamps whenever needed. [5]

Based on the same work theory, the team worked under the supervision of the researcher to design a unit with two separate connected parts as shown in figure (8), the front part of which contains a micro wind generator, while the back part contains a lithium rechargeable battery, USB ports and some other complementary parts, so that the back part can be detached and used as a power bank once the generator finishes charging the battery as shown in figure (9) or when the trip is over.

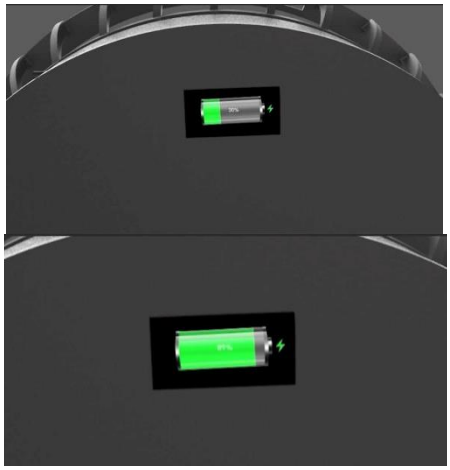

Figure (9): the charging process of the lithium battery located at the back part of the unit

Figure (10): the design idea implemented by the team

Discussion: -

The team was able to create a design idea for a unit as shown in Figures (10, 11, and 12) that can be mounted or removed on the roof of the car.

Figure 11: The design unit located at the roof of a vehicle

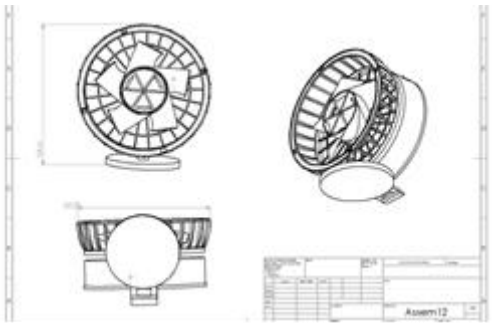

Figure 12: part of the assembly drawing of the unit

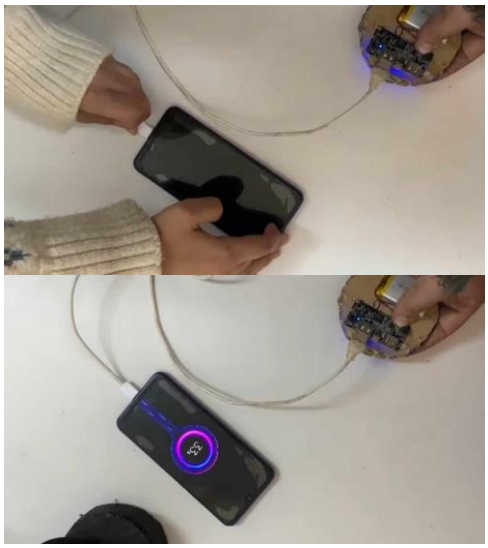

Figure 13: Using the back part of the unit prototype to recharge a mobile battery.

The team also implemented a first sample of that unit that was practically tested under the supervision of the researcher.

The test experiment confirmed the success of the proposed idea of converting wind energy resulting from the movement of the vehicle into electrical energy and storing the resulting energy in a lithium battery then used to charge a cell phone battery as shown in figure (13). The validity and effectiveness of this was confirmed during the conducted experiment.

Figure 14: Digital multi-meter

Conclusion

Vehicles moving at a speed of not exceeding 20 km/h can generate approximately 3 volts 50 mA of electricity measured using a digital multi-meter device figure (14), and the amount of electrical energy generated is directly proportional to the speed of the vehicle's movement.

The proposed design idea or concept is fully suitable for daily life activities and within city roads and capital streets, but it may need further study to ensure its suitability for use on highways and at high speeds.

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