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Tiny windmills may one day power cell phones

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Smitha Rao and J.-C. Chiao of the [University of Texas](#) created what is said to be the world's smallest wind turbine that could one day power portable electronics and recharge smartphone batteries.

The micro-[windmill](#) is so small that 10 such windmills could be mounted on a single grain of rice. The device is about 1.8 mm at its widest point. Rao, along with J.C. Chiao, a professor of electrical engineering at UT, developed the technology based on recent advances in [micro-robotic](#) devices.

"Hundreds of the windmills could be embedded in a sleeve for a cell phone," the researcher claimed. "Wind, created by waving the cell phone in air or holding it up to an open window on a windy day, would generate the electricity that could be collected by the cell phone's battery."



Figure 1: A micro-windmill is pictured on the face of a penny. Credit: UT Arlington

The MEMS-based nickel alloy windmill "blend origami concepts into conventional wafer-scale semiconductor device layouts so complex 3-D moveable mechanical structures can be self-assembled from two-dimensional metal pieces utilising planar multi-layer electroplating techniques."

The micro windmills were tested successfully in September 2013 in Chiao's lab. The windmills operate under strong artificial winds without any fracture in the material because of the durable nickel alloy and smart aerodynamic design.

"The problem most MEMS designers have is that materials are too brittle," Rao said. "With the nickel alloy, we don't have that same issue. They're very, very durable."

"Imagine that they can be cheaply made on the surfaces of portable electronics," Chiao said, "so you can place them on a sleeve for your smart phone. When the phone is out of battery power, all you need to do is to put on the sleeve, wave the phone in the air for a few minutes and you can use the phone again."

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