

A way to obtain energy of footsteps

José Ángel Conejo Mínguez

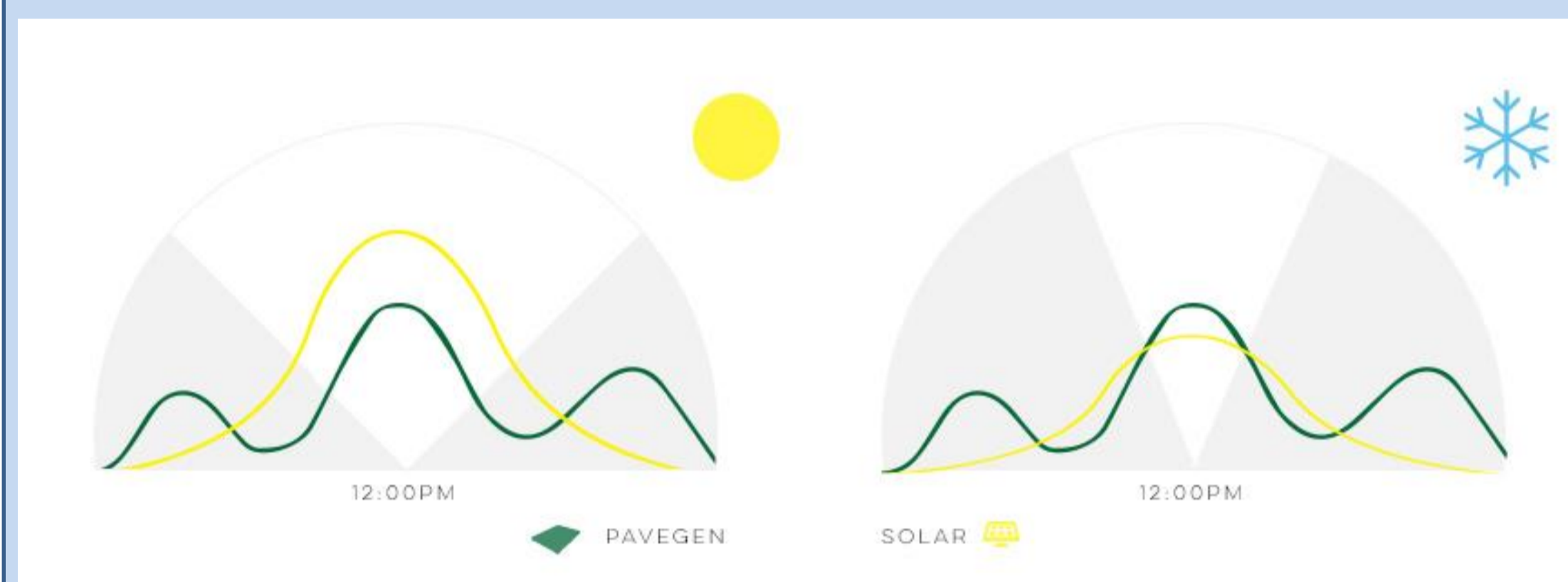
Departamento Tecnología Electrónica
E.T.S.I Telecomunicación, Universidad de Málaga

Abstract

In this work we analyze a new way to obtain energy by taking as a source the human footsteps. The energy is obtained with special tiles which are made with recycled materials. The resultant energy could be stored or used instantly, it depends on the final application. Furthermore two scenarios are presented as a way to use these tiles. Both of them have the goal to get energy and to aware people to search new ways to obtain renewable energy.

Introduction

Laurence Kemball-Cook had the idea of obtaining energy using a tile and a footstep while he was working in a electricity enterprise taking part in an internship. He had to do a research about the application of the eolic and solar energy in urban areas, but no one fit properly. For this reason he started to do a research about the energy that one footfall could generate.



The tiles are made by Pavegen System, a new Enterprise funded by Kemball-Cook. The tiles are used in places with a huge influx of people as a train station, airports, malls,... The energy produced by one step could be insignificant but we have to take in to account that while we are in a mall we could take around 1000 steps, which could be enough to feed lights or wireless connections (WiFi).



Main features

- They can collect and communicate real-time footfall data for analytics, information on pedestrian movements and even social media updates.
- Easily branded surfaces and a range of textures to fit into high-end retail, transport and public realm works.
- The technology has been tested to withstand over 20 million footsteps and extreme weather conditions. The tile even works submerged underwater at a depth of 1.5m.
- Each tile can be daisy chained to the next tile and all wiring runs through the tiles themselves.
- They can harness the energy from footfall to power applications directly, or store the electricity for later use.
- This tiles generate power when other renewable energies can't.
- The top surface of the tiles uses up to 100% recycled rubber, from old truck tyres. Some base models use a 50-50 mix of virgin and recycled rubber.

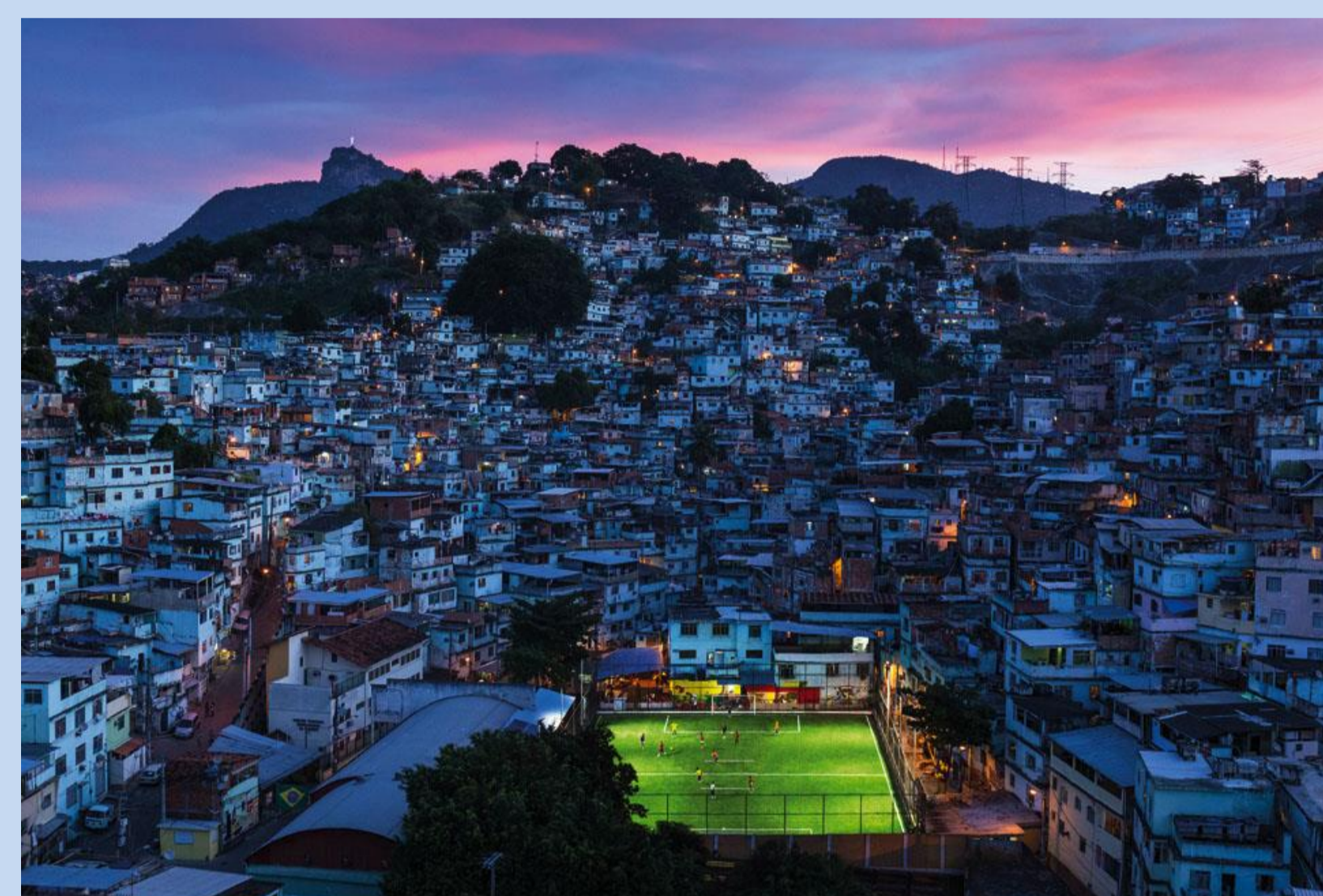
Applications

- The tiles can contribute towards powering and triggering poster advertising, light boxes and LED displays, encouraging interaction and engagement with the display.
- Energy harvested from footsteps can be used to directly power off-grid applications such as lighting, wayfinding and advertisement boards. The energy can also be stored in an external battery for powering future applications.
- They can be used to help power low-energy LED street lighting, enabling an efficient, off-grid and cost saving solution for communities.
- It is an innovative and interactive new solution for directional signage. It can be used to trigger illuminated signs in airports, public transport stations, office buildings, hospitals, malls, parks, sports facilities, university buildings, libraries and museums.

Scenarios

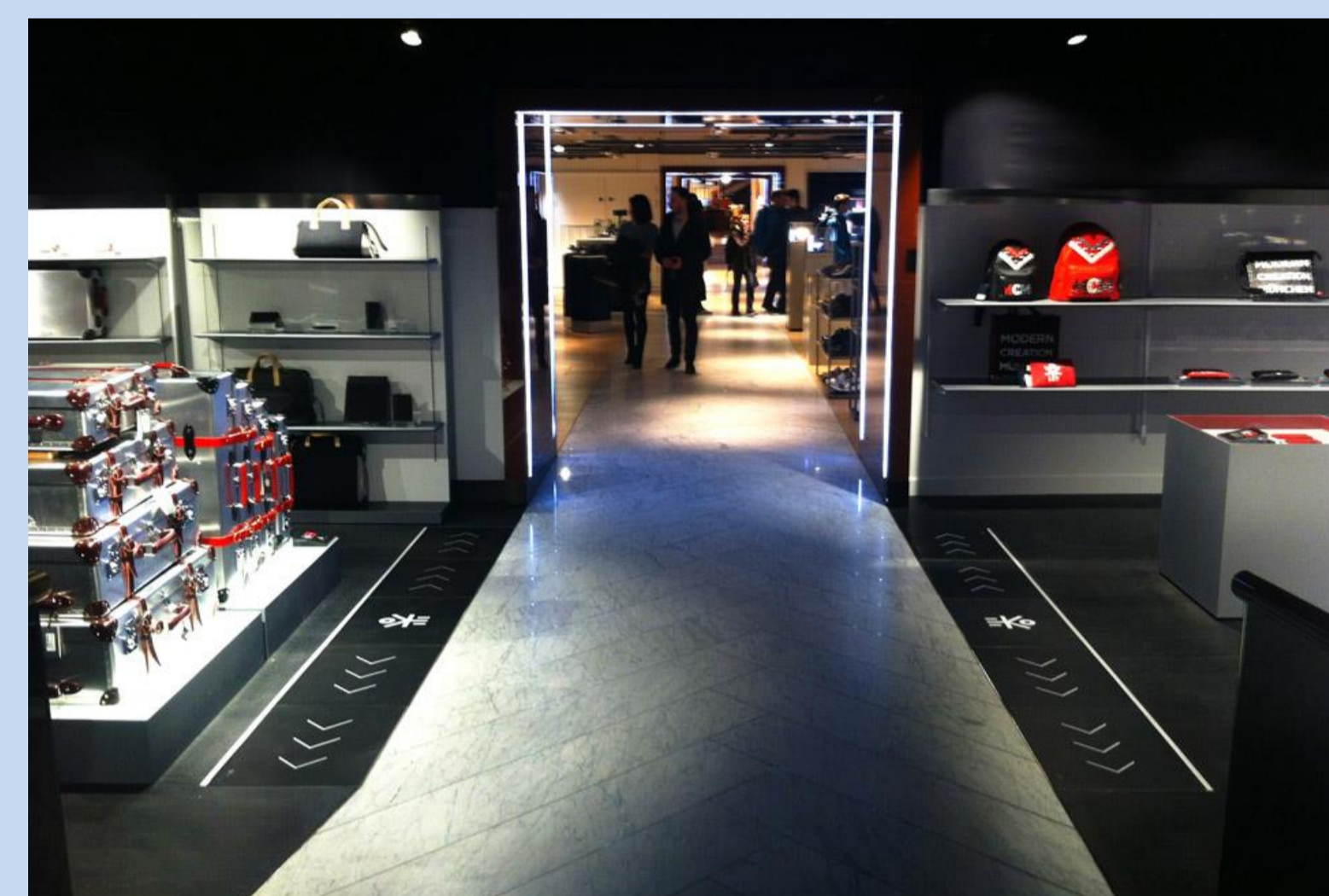
One of the huge projects which use that technology works day and night alongside solar panels to power the lights for up to 10 hours on a full battery, creating the world's first ever people-powered football pitch. This is the first-of-a-kind energy solution as a source of global inspiration, empowering action through sport as well as providing a tangible off-grid power supply that benefits a whole community.

This project is an incentive to encourage entrepreneurial growth and disruptive behavior, allowing the community to take part of the energy generating saving process at the same time they play.



Another important project took place in London the 5th March, where Pavegen showcased their technology to the world's media. Attracting 15 million shoppers a year, Harrods is the third most visited destination in the UK. The daily footfall rate makes the department store an ideal location for Pavegen's footfall energy-harvesting technology.

Harrods are supporting green initiatives within the retail sector by showing consumers how a small change in their daily routine can reduce their carbon footprint.



Conclusions

In this work we have analyzed a new way to obtain "Green energy". Although the energy obtained with this technology is so reduced, using many tiles is possible to do some tasks which requires little energy. Some of the positive aspects are:

- New way to obtain renewable energy
- It encourages the necessity to find new renewable sources
- A new way to take advantage for something that many people do daily
- Long-term savings
- Easy to install
- It generates useful information to study pedestrian patterns

Some of the disadvantages for this technology are:

- It generates reduced energy
- It needs many tiles to obtain enough energy
- Sometimes it is necessary batteries to save the produced energy
- They need to be installed in places where the influx of people is huge

References

- Energy Floors. Sustainable Dance Floor. http://www.energy-floors.com/products/sustainable_dance_floor/
- Pavegen Systems. <http://www.pavegen.com/>
- Killian Fox (11 January 2015). The floor tiles that use foot power to light up cities. The guardian. <http://www.theguardian.com/technology/2015/jan/11/floor-tile-generates-power-from-footsteps-energy-electricity-startup>
- National Geographic. Unas baldosas generan energía con nuestras pisadas. <http://www.nationalgeographic.es/noticias/medio-ambiente/energia/baldosas-energia-pisadas>