Turning Flat Surfaces into Touchpad Technologies

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Abstract

The article considers the innovative turning flat surface into touchpad technologies, their promising implementation into science and engineering for educational and commercial purposes. The advantages and some limitation of the presented technologies are analyzed, the prospects for future use are suggested.

Keywords: flat surfaces, touchpad, conductive paints, touch-sensing capabilities, 3D printing.

Introduction

A touch interface is common for small, flat surfaces such as smartphone or tablet screens. Carrige Mellon University researchers have now developed a technology to turn surfaces of a wide variety of shapes and sizes into touchpads. The innovators presented the technology at the ACM Conference on Human Factors in Computing Systems in Denver in May, 2017. The scientists named this technology as Electrick. It holds the potential to turn any wall, furniture, steering wheels and even toys into touch sensors. The user just needs to apply any electrically conductive coatings or materials on the objects or surfaces. Some methods depend on computer vision, which can be disrupted if a camera's view of a surface is blocked. Unlike such interfaces, the Electrick works slightly different. It can be created by applying conductive paints, bulk plastics or carbon-loaded films, among other materials.

The technology is very similar to how touch screens work. When the user's finger touches on an electric field, it will shunt a fraction of the current to the ground, and by tracking where the shunting of the current happens, we can track where the user touches the surface. The technique is known as electric field tomography and uses an array of electrodes to detect the position where the touch occurred. The researchers said the technology could be used for educational purposes, by hobbyists and in other commercial applications. The goal of this technology is to enable touch sensing on everything. Currently available large touch interfaces are expensive and irregularly shaped. Additionally, the flexible touch interfaces are being used in labs only. The advantage of the technology is that touch has been very successful. It's a very intuitive way to interact with computer resources. We could enable these touch-sensing capabilities in many objects not only just phones and tablets. Smartphone touch screens are made of expensive materials and require costly and sophisticated techniques to build. Thus, it can be complicated to create touch surfaces on objects that are large or irregular in shape. There are ways to enable touch control on larger objects, but these methods mostly rely on detection of motion by cameras. However, these techniques also have limitations. The Electrick technique enables touch control in objects that have been created using a wide range of manufacturing methods, including 3D printing and injection molding. The only condition is for the material to be slightly conductive. It wouldn't work with normal plastic, which is totally nonconductive. But one can use various carbon-loaded materials, materials that have carbon particles inside them, which make them slightly conductive. The slightly conductive layer can also be sprayed onto the surface of an otherwise-nonconductive object of any shape. This way, the engineers can enable touch control in existing pieces of furniture, make a touch-controlled steering wheel or phone case, or enable someone to turn on the lights in their apartment by simply tapping the wall. The Electrick surfaces are durable and could get additional protection by adding an extra layer of coating on top. The common ways to use the technology are:

- Touch controlled furniture or walls. For example, lights can be turned on by just touching the wall, instead of a switch.
- A touch sensitive steering wheel can improve driving experience.
- A smartphone case could use Electrick to perform a number of functions like opening apps or controlling volume etc.
- A joystick could modify itself to suit individual gamer preferences.
- The researchers created a touch sensitive guitar with custom control options.

Conclusion

Researchers have already tested Electrick on a large number of objects. They kept in mind that the most common uses of this technology will be for educational and commercial purposes. The suggested technology has many prospects in science and engineering, education and manufacturing process.

References

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