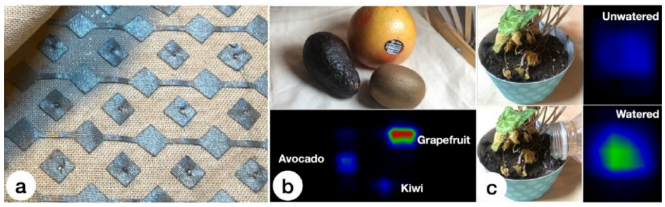
Capacitivo: A contact-sensitive technique that can be used to make smart tablecloths

26 October 2020, by Bob Yirka



(a) Capacitivo is an interactive fabric, capable of sensing a wide variety of non-metallic daily objects it is in contact with. (b) For example, the fabric sensor can sense different types of fruits. (c) It can also sense if the soil of a table plant is wet or dry. Credit: *Proceedings of the 33rd Annual ACM Symposium on User Interface Software and Technology* (2020). DOI: 10.1145/3379337.3415829

A team of researchers at Dartmouth College, working with Microsoft Corp., has developed a contact-sensitive object-recognition technique called Capacitivo for creating interactive fabrics. In their paper published on the ACM digital library site for the upcoming User Interface Software and Technology Conference, the group describes their technique and how well the prototype they built worked when tested.

Over the past decade, attempts have been made by several companies to create bendable personal electronics for integration in smart clothes. To date, most such efforts to merge electronics with bendable fabrics have focused on fabrics that are meant to be worn. In this new effort, the researchers have switched their focus to fabrics used to make other products, such as tablecloths and furniture coverings. Their idea was to make such surfaces aware of what has been placed on them and then use that information to provide a service. Setting a variety of fruits on a table covered with a smart tablecloth could, for example, allow an associated device such as a smartphone or smart-speaker to suggest different meals that could be prepared using that fruit.

The researchers note that prior efforts by others to make similar products were based on creating fabrics that could recognize metallic objects. With their effort, they have developed a technique that works for non-metallic objects such as food and liquids. Their technique involves weaving a grid of electrodes into a cloth attached to a textile substrate. The integrated sensors detect changes in the capacitance of electrodes as they are affected by the presence of an object. The cloth is then attached to a deep learning system and trained to recognize objects.

The researchers tested their idea by creating a 12-by-12-inch tablecloth prototype which they attached to a laptop running the deep learning system. As pieces of fruit were placed on the prototype, the system would analyze how they impacted the tablecloth and display the name of the fruit on the screen. After multiple tests, the researchers found the system to be 94.5 percent accurate. They suggest that such a system could be used for a wide variety of purposes, including reminding users of objects they have left behind on a table and assistance with planning meals.

More information: Te-Yen Wu et al. Capacitivo, *Proceedings of the 33rd Annual ACM Symposium on User Interface Software and Technology* (2020). DOI: 10.1145/3379337.3415829

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