LightCloth: Senseable Illuminating Optical Fiber Cloth for Creating Interactive Surfaces
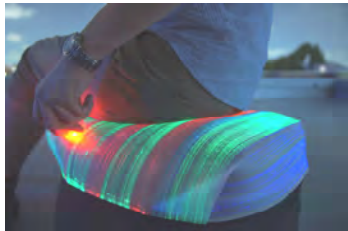

Figure 1. LightCloth enables full-color illumination, bi-directional data communication and position sensing on soft surfaces.

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Abstract
We introduce an input and output device that enables illumination, bi-directional data communication, and position sensing on a soft cloth. This "LightCloth" is woven from diffusive optical fibers. Sensor-emitter pairs attached to bundles of contiguous fibers enable bundle-specific light input and output. We developed a prototype system that allows full-color illumination and 8-bit data input by infrared signals.

Author Keywords
Soft deformable user interface; diffusive optical fiber; illumination; light communication; position sensing.

ACM Classification Keywords
H.5.2. Information interfaces and presentation (e.g., HCI): User Interfaces.

What is LightCloth?
An optical fiber typically acts as a waveguide from one end to the other. Another type of the fiber is "diffusive" optical fiber which leaks some light through micro-scratches on its surface. A cloth woven from such diffusive optical fibers has been used in fashion and spatial design fields for making light-emitting fabric products [1, 2]. A diffusive optical fiber not only leaks light but also receives light incident on its surface. The light entering from the scratches on the surface goes through the core and leaks out from the ends. Focusing on this property, we developed a new fabric I/O (input and output) device, called "LightCloth," that enables illumination, bi-directional data communication, and position sensing (Figure 1).

References
[1] Lumen. http://www.lumen.jp/
[2] LumiGram. http://www.lumigram.com/