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(54) **SYSTEMS AND METHODS TO GENERATE HAPTIC FEEDBACK FOR SKIN-MEDIATED INTERACTIONS**

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CPC **G06F 3/018** (2013.01); **G06F 3/016** (2013.01); **G06F 3/041** (2013.01); **G06F 3/04886** (2013.01)

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See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

8,740,825 B2 *	6/2014	Ehrenreich	.....	A61H 1/00	381/151
8,988,373 B2 *	3/2015	Thorn	.....	G06F 3/011	345/173
8,994,672 B2 *	3/2015	Thorn	.....	G06F 3/011	345/173
9,024,870 B2 *	5/2015	Kim	.....	G06F 1/1626	345/156
2011/0155044 A1 *	6/2011	Burch	.....	G06F 3/016	116/205
2012/0056825 A1 *	3/2012	Ramsay	.....	G06F 3/016	345/173

(Continued)

FOREIGN PATENT DOCUMENTS

EP 2 256 592 A1 12/2010

OTHER PUBLICATIONS

Gustafson, S., et al., "Imaginary Phone: Learning Imaginary Interfaces by Transferring Spatial Memory from a Familiar Device," UIST'11, Oct. 16-19, 2011, Santa Barbara, CA, USA, pp. 283-292.

(Continued)

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(57) **ABSTRACT**

A system includes a sensor configured to sense an input at a skin surface, a processor configured to receive an output signal from the sensor and generate a haptic control signal based on the output signal, and a haptic output device configured to generate a haptic effect based on the haptic control signal.

23 Claims, 9 Drawing Sheets

