



(19) **United States**

(12) **Patent Application Publication**
Mäkinen et al.

(10) **Pub. No.: US 2011/0074733 A1**

(43) **Pub. Date: Mar. 31, 2011**

(54) **INTERFACE APPARATUS FOR TOUCH INPUT AND TACTILE OUTPUT COMMUNICATION**

Publication Classification

(51) **Int. Cl.**
G06F 3/045 (2006.01)
(52) **U.S. Cl.** **345/174**
(57) **ABSTRACT**

(76) Inventors: **Ville Mäkinen**, Espoo (FI); **Petro Suvanto**, Vantaa (FI); **Jukka Linjama**, Espoo (FI)

(21) Appl. No.: **12/993,784**

(22) PCT Filed: **May 19, 2009**

(86) PCT No.: **PCT/FI09/50416**

§ 371 (c)(1),
(2), (4) Date: **Nov. 19, 2010**

(30) **Foreign Application Priority Data**

May 19, 2008 (FI) 20085475
Sep. 17, 2008 (FI) PCT/FI2008/050514

An interface apparatus (1600A) comprises a surface (1642) touchable by a finger (120). The surface has a touch-sensitive area with a predetermined position (1646), to which a function is assigned. The finger's presence at the predetermined position (1646) is detected. An electrosensory stimulus is generated to the finger by applying an alternating electrical drive to one or more electrodes (1662). Each electrode is provided with an insulator, which prevents DC flow from the electrode to the finger and a capacitive coupling over the insulator is formed between the electrode (1662) and the finger (120). The capacitive coupling and electrical drive are dimensioned to produce an electrosensory sensation, independently of mechanical vibration of the electrode. The electrosensory stimulus is varied temporally based on the detected presence or absence of the of the finger (120) near the at least one touch-sensitive area having the predetermined position (1646).

