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## Guide you anywhere by Buru-Navi

- Tactile navigation in indoor/outdoor/virtual spaces -

### Abstract

We are exploring mechanisms to transmit the information of force and tactile sensation to human by a mobile vibration gadget. By investigating dynamic transmission characteristics of an asymmetric vibration to the skin, we have newly formalized an efficient principle for designing a mobile force display device. Owing to this principle, **Buru-Navi**, mobile force display gadget, now can take various forms, such as a **smartphone shell type** and **cubic shaped controller** both of which can induce directional force sensation in multi degree-of-freedom.

The cubic controller is attractive to realize a **VR navigation by force display in six degree-of-freedom**, and the smartphone shell type enables us to **navigate pedestrian with a sensation of being pulled with hand**. We will showcase some examples of possible application for navigation.



T-type  
(2DoF-translation)



P-type(1DoF-translation,  
1DoF-rotation)

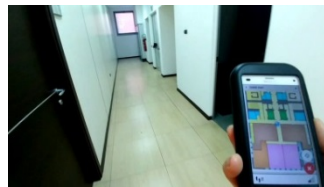
B4-ShellForce



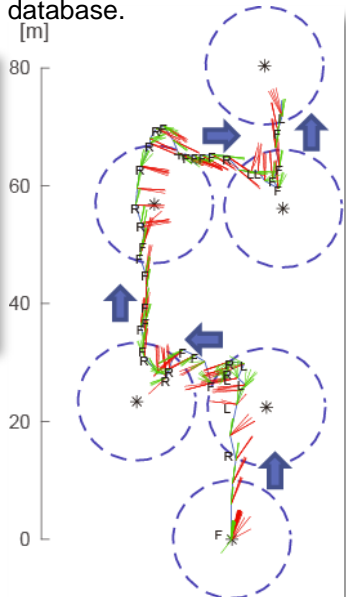
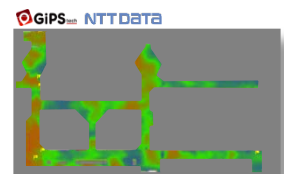
B4-CubicForce 6DoF



VR navigation by force display



Indoor pedestrian navigation by force sensation  
and geo-magnetic field database.



Outdoor pedestrian navigation  
by force sensation and GPS

### Reference

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- [2] T. Amemiya, H. Gomi, "Pedestrian Navigation System Utilizing Effectiveness of Dynamic Exploration for Force Direction Perception," *The IEICE transactions on information and systems*, 97(2), pp. 260-269, 2014.

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