



Bioinspired navigation and water vapor detection realized with microelectromechanical systems (MEMS)

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This work proposes a MEMS navigation device based on the skylight polarization patterns and a MEMS water vapor detection device as survival tool to assist people in finding water. The concept study overviews the mechanism of detection of polarized light and water vapor in animals and translates these concepts to engineering.



X_1 ... Signals too weak for Human Sensory System (Strength)

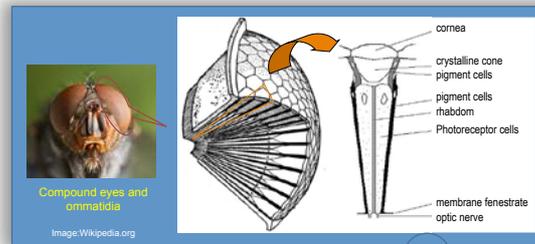
X_2 ... Signal types not covered by Human Sensory System (Type)

Functional regions of smart MEMS sensors compared to the human sensory system.

Replica of Viking's navigation conventional device based on polarized skylight



(a) Cordierite crystal pictured in Kuala Lumpur at 03:00pm.
(b) Cordierite crystal pictured in Kuala Lumpur at 06:26 pm.



Outlook 1: Device Features

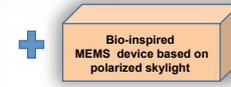
1. The new method of navigation based on light polarization shall be realized using photo-sensitive MEMS which have the capability to capture the angle of the entering light beam.
2. The proposed MEMS device for the water detection works with the infrared spectrum OR with infrasound.

Outlook 2: Challenges

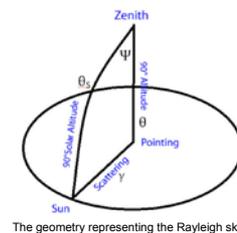
1. Filtering the incoming sunlight reflections (e.g. reflection in the sea or at glaciers) and cancellation of the scattering within the polarization pattern are the most challenging task for the proposed navigation device.
2. The detection of water vapor near the ground is still at the beginning phase but has a very important goal especially to provide drinkable water to all mankind for survivability.

References:

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5. B. Suhai and G. Horváth "How well does the Rayleigh model describe the E-vector distribution of skylight in clear and cloudy conditions? A full-sky polarimetric study", J. Opt. Soc. Am. A 21(9), pp. 1669-1676, 2004.
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Allows for navigation anytime, anywhere and in any condition such as on the sea in cloudy conditions.



The geometry representing the Rayleigh sky

