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(G) (POS-39) Development of a Cutaneous Facial Electrical Stimulation Device for the Production of Phosphenes

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Electrical stimulation around the ocular region of the head produces a phenomenon known as phosphenes. Phosphenes are the appearance of white flashes within the visual field when no light has entered the eye. This virtual light arises from the excitation of retinal neurons, triggering action potentials that travel through visual pathways to the visual cortex, leading to the perception of light. Due to many visually impaired individuals possessing surviving retinal neurons, phosphenes are able to be visualized by the visually impaired. Current phosphene stimulation techniques involve either invasive or non-invasive application of current. This project will focus on non-invasive techniques due to its safety, ease of use and cheaper cost compared to invasive surgical procedures. However, non-invasive techniques are limited by their spatial accuracy of where phosphenes are produced in the visual field. This project will first focus on improving accuracy with the future goal of producing phosphene shapes. Along with this, a plan to develop a mobile phosphene stimulator mask has been outlined. The mask will be worn as an aid by the visually impaired as they navigate the world. Lastly, a 3D simulation of the phosphene stimulator applied to a human's ocular area will be rendered using COMSOL Multiphysics Software. This simulation will assess the current's path and dose aiding in further understanding the phosphene phenomenon.

Keyword-1

Phosphenes

Keyword-2

Neurostimulation

Keyword-3

Visual prosthesis

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