Obstacle Detecting Tactile Device for Assisting Spatial Orientation of the Visually Impaired and Blind People

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The goal of the project is to create an intellectual, socially oriented device, which can aid blind people to move avoiding obstacles. The newness of the device is a usage of casual hat equipped with ultrasound sensors. Microcontroller processes data receiving from sensors and controls vibromotors which sewn in the hat's crown from inside. Vibromotors inform the user about location and the distance to an obstacle by vibration method. Motors vibrate with different frequency depending on the approaching or moving off the obstacle. Developed electric circuit and program code for microcontroller make it possible for the device to be operated in real time. For example, if there is a wall ahead – it will be vibration on the forehead. If the obstacle is behind, vibration will be on the back of the head. The prototype allows to orientate in the space with the obstacles on 4 meters distance. The device was demonstrated in All Russia Association of the Blind to be sure of practical significance of the device. As a result the second version of prototype was created. The innovative approach was to make the device more convenient- in the form of an ordinary baseball cap, and to reduce the weight of the device. There were developed 3d model of frame and compact printed circuit board. Frame was printed on the 3d printer. Three ultrasonic sensors with 65 degrees step, controlled by electronic circuit (inc. microcontroller) and power source are put inside the frame. It allowed to reduce the weight of device and to be put inside the baseball cap. The presented prototype is easy to make, and can be customized for any user. It can assist blind people to be more independent and be active members of the society. The price is less than $20, so it is available to most of blind people.