**Title: O.W.E.N - Optimal Wheelchair for Enhanced Navigation**

By group 5

**Introduction:**

Persons with Disabilities (PWD) make up a significant portion of our population, and many of them rely on wheelchairs for their mobility. The importance of creating advanced wheelchair technology cannot be overstated, as it has the potential to significantly enhance the quality of life for PWD. This research's primary goal is to develop a smart wheelchair, known as O.W.E.N, designed to improve navigation and mobility for PWD.

**Body:**

**Components:**

At the heart of the O.W.E.N smart wheelchair lies the Raspberry Pi, a small yet powerful computer that serves as the central processing unit (CPU). The Raspberry Pi is a versatile choice due to its compact size and computational capabilities. It is equipped with various input and output ports, making it ideal for connecting and controlling other components of the wheelchair.

**Voice and Eye Control:**

O.W.E.N's cutting-edge control system leverages voice commands and eye-tracking technology to offer users a new level of mobility and freedom. The voice recognition software employed in O.W.E.N is powered by advanced algorithms that can understand and interpret spoken commands. This software works in tandem with an array of microphones strategically placed around the wheelchair to capture voice commands effectively.

The eye-tracking technology, on the other hand, employs specialized cameras to track the user's eye movements. This information is then processed by sophisticated software that can accurately determine the user's gaze and intent. The combined use of voice commands and eye tracking creates a redundant and versatile control system, ensuring that users can control the wheelchair effectively regardless of their specific needs and abilities.

**Electric Motor and Mobility:**

O.W.E.N represents a significant advancement in wheelchair mobility by transitioning from traditional manual wheelchairs to electric-powered ones. The electric motors used in the smart wheelchair are carefully integrated into the wheelchair's frame, ensuring a seamless and efficient transition between manual and electric operation.

These electric motors are not just any motors; they are smart motors that receive commands from the Raspberry Pi. The software controlling these motors is designed to provide smooth and precise movement, allowing users to navigate tight spaces and execute intricate maneuvers with ease. Whether users need to navigate a crowded room or traverse outdoor terrain, the electric motors provide the necessary power and control.

**Obstacle Detection and Avoidance:**

Safety is a top priority in the design of O.W.E.N. To ensure user safety, the wheelchair is equipped with a sophisticated array of sensors, which may include ultrasonic sensors or lidar (Light Detection and Ranging). These sensors emit signals and measure the time it takes for these signals to bounce back after hitting an object. The data collected by these sensors is continuously processed by the onboard software to create a real-time map of the wheelchair's surroundings.

Should an obstacle be detected, the software initiates an avoidance maneuver. The electric motors are adjusted to steer the wheelchair around the obstacle, ensuring that users can navigate smoothly while avoiding collisions. The integration of these sensors and software creates a reliable and safe mobility solution for users.

**User Interface and Customization:**

The user interface of O.W.E.N is designed for accessibility and ease of use. It may include a touch-screen display or voice feedback options, ensuring that users can interact with the smart wheelchair in a way that suits their preferences.

Furthermore, O.W.E.N is designed with customization in mind. Users can tailor the control interface to their specific needs, whether that involves adjusting the sensitivity of the eye-tracking system, choosing voice command phrases, or configuring the interface layout. This customization ensures that O.W.E.N is a versatile mobility solution that adapts to individual user requirements and preferences.

By combining these components with advanced software, O.W.E.N creates a seamless and efficient user experience, providing increased mobility and independence for individuals with disabilities.

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