Alternative Design 3

ATPC X42 All-Terrain Power Chair

by

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Design 3 involves a six-wheel power chair operating on mid-wheel drive. This is the way the client’s current chair is designed. Since it is a common power chair layout, a pre-existing chassis will be obtained and modified to increase the stability by allowing larger tires and a lower center of gravity. This design will provide increased front and back stability due to the orientation of the wheels; however, the suspension will have to be improved to better the left-right stability of the chair.

This design places all six wheels under suspension so that each wheel will be able to maintain contact with the ground, even if the terrain is rough or uneven. It will involve a spring-shock absorption mechanism that will dampen impacts from the front and rear wheels. These springs lead to a third spring, which will further reduce the forces experienced by the operator from all wheels.

The electrical components involved in this design are the two batteries sending power to the motors, which will be controlled by the joystick. When the joystick is left in the neutral position, no power will be sent to the motors, and when the joystick is pushed in a certain direction, the motors will follow respectively. Also, the tilt sensor will require power to properly activate the warning system if the chair approaches dangerously steep slopes. The grade determined by the tilt sensor will also control the seat actuator. The actuator will orient the seat such that the operator is always looking ahead and not up at the sky or into the ground when going up and down hilly terrain.
The software that will be used to control the joystick and tilt sensor are a microcontroller, which will be programmed in C. It will allow the chair to stop when the joystick is neutral, move forward when pressed forward, and so on. It will also set off the tilt sensor alarm when the orientation sensor recognizes a slope too steep.