Alternative Design 2

ATPC X42 All-Terrain Power Chair

by

Vikram Shenoy, Niaz Khan, Selome Mandefro, Alex Mann

Annalee Hughes, NSF Projects

Tolland, CT; (860)-872-7000
Design 2 involves purchasing a power chair and modifying the chassis, rather than machining a chassis from raw materials. If a pre-made chassis could be obtained, it would be much less laborious to simply modify it to the desired specifications, including a wider wheel base and a low center of gravity. It would also make the rest of the assembly easier because all of the other internal components, such as the motors and gearboxes, would already be in place. However, the main drawback of this design is the cost of obtaining a power chair, which could be expensive.

Four off-road tires will be used, with the rear two tires being larger than the front two tires. Also, the two rear tires will be powered by individual motors, so that both tires do not need to be powered simultaneously when turning left or right. This will significantly decrease the turning radius and increase maneuverability. The size and width of the tires will also help decrease the center of gravity and increase the overall stability of the chair, making it safe to operate on rough terrain. Two small wheels will also be placed in the back of the chair to act as a further precaution against tipping. These will not be in contact with the ground normally, and will instead balance the chair if it does lean backwards.

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.