Progress Report

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Introduction

To build our project we have broken it down into three main sections which consist of the following:

- The frame structure and bed side attachment mechanism
- The electronics components and microcontroller programming
- The motor modules.

We have touched on and made strides to develop each individual piece and are reaching the phase for integration.

Frame structure

The construction of the frame which is the main part of our design has been moving along. Due to the resources we have access to we have changed our main frame material of our prototype from metal and plastics components to an entirely wooden construction. We currently have the entire frame components sketched out and cut into their individual blocks but they still require preparation to be shaped to meet our outlined specifications and sanded down to uphold safety standards. The mounting of the motor modules onto are frame is still refined but there is a general idea about how that will be done. From out estimations and work flow progress we see that the construction of the frame is nearing

80% complete. There is still work to be done on completing the structural frame that holds the lifting arm together as well as the attachment mechanism use to mount our device next to the user's bed.

Electronics Section

At first glance when going through our needs for our electronics components, it looked very simple and straight forward. Our initial list of components that we required for our project design comprised of:

- A microcontroller which we chose to be the Arduino UNO since it fits our basic requirements
- A motor driver and shield combination to drive our motors and protect our delicate electrical components
- Sensors to detect special cases and monitor our system
- Switches for user controlling inputs
- A regulated AC/DC power adaptor to power our components and motors.

However, we notice very early on that finding all the necessary parts to finish our circuit locally was very difficult due to the lack of suppliers and availability of parts from suppliers. Although it took more work locating local suppliers to buy parts from, we had the benefit of having the availability of asking local electronic supplier's questions in terms of what we needed and what would be recommended for our situations.

At the current moment we have begun soldering and hooking up our main electronic component which would be our microcontroller and motor driver. We still have yet to start on the controller unit which allows the user to control our system manually. What also has not been start is the mounting of our sensors in the needed locations since we need to wait for the completion of our frame to begin that process. Gauging at the situation that we are currently in, we estimate that we are only around 40%-50% complete since we have no begun programming our microcontroller yet.

Motors Modules

Our project design required two different types of motors to perform the lifting action that we have described in our previous specification reports.

- One Rotational motor that is to carry the users legs and lift them up to the desired height. This motor needed to have enough torque to hold up the weight of our lifting mechanisms arm components as well as the user's legs. At the same time we required the motor to rotate at a slow pace to ensure that while our users are operating our system they feel that they are under control of the system, and can stop the system at certain positions so that they are able to adjust their body as needed.
- One Linear actuator which is to be used in conjunction with our rotational motor to shift the legs of the user closer to the bed as they were being lifted off the ground. This shifting motion which

we found through our tests was the more comfortable method of shifting a person from an upright sitting position next to the bed with their feet touching the floors to a flat sleeping position on their bed. As like the rotational motor, it needed to be powerful enough to withstand the weight applied on it while needing to move slowly at the same time.

It turned out to be a challenge to find such motors that fit such a description of having high torque power but slow rotational speeds. We spent countless weeks trying to search for a part that fit our needs and discovered a local supplier which was able to supply us with a motor used in linear actuators. We have current tested our motor and actuator on two separate occasions and have them ready to be added to the electronic circuit.

Problems or Issues

The worrying issue we have at the moment is the limitation of our integrated chips and the power needed to drive our motors. When we tested our motors, they both require 12 V and at least 1 A each to operate under load. However, our motor driver is only capable of handling currents up to 2 A and could potentially fail if fed more current then specified. We are unsure how running close to the current limits will affect our system over and what strains will they put on our parts. If it continues to be a concern, then we may have no choice but to operate our motors one at a time rather than having the motors operating at the same time as we initially want, that way only one motor is drawing up to 1 A of current at any instance and are away from our current limits on our electronic components.

Conclusion

Our project progression is on its way and we have objectives in place to help us continue to forge along with our designs and development progress. We seem to be to be slightly behind our initial schedule that we set up in our proposal due to reasons such as looking and waiting for specific parts, running into construction road blocks that needed to be addressed or handling our time with this project along with other class work. We will do all that is necessary to complete this project on time to demo on one of the following days: December 16th, 19th, or 14th. (Place in order of group preference.)