EE 324L Microcontroller and Interfacing Lab

Project Report

“Bluetooth Enabled Remote Controlled Bed”

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Project Problem Statement

Some people do not have the capability of moving themselves when they are in bed, especially those who are immobilized or paralyzed, and those who suffer from spinal injuries. They need external help to change bed positions.

Introduction

Handicapped patients in hospitals are confined to their beds and do not have the requisite strength in their hands and body to physically move themselves to adjust their position.

The project is focused on making a remote-controlled hospital bed which is controlled via a phone connected to the bed via Bluetooth. The user can raise and lower the headboard and the leg portion of the bed as well as drive the bed itself using the phone. As the phone would have a touch screen, no physical buttons would need to be pressed and no extra exertion would be required from the user. That's how such patients can control their beds with no requirement of physical strength.

We hope to empower handicapped patients, making them more self-sufficient so that they do not have to rely on external help for their mobility.

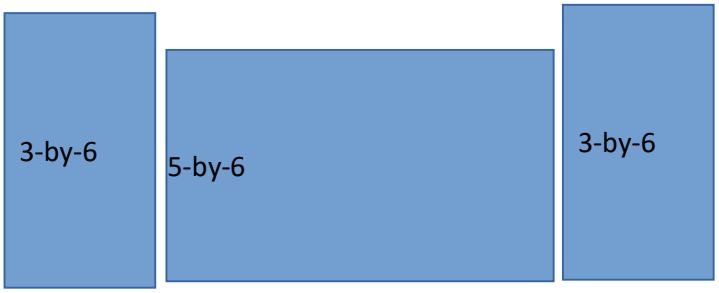
Design and Execution

- **Theory:**

  Two important sections of the prototype have been considered for its design. One is its mechanical system, and another is its electronic part.

  Mechanical part: includes the manipulation of movement of panels mechanically. We used wooden gears with motors to lift the panels of bed. Their use allows to transmit power efficiently from motor to bed.

  Bed is made up of acrylic sheet with following dimensions.
  Two parts of 3-by-6 inches, each for head and leg side which can be moved up and down. Third part of 5-by-6 inch is fixed. All three are connected together to complete the bed.



Electrical Part:

DC motors have been used to drive the bed as bed can be moved automatically. Also to lift the panels of bed, DC motors are used. Power of these motors was taken into consideration while lifting the panels.

A Bluetooth module is used to control the whole system. Bed can be connected and controlled through a smart phone.

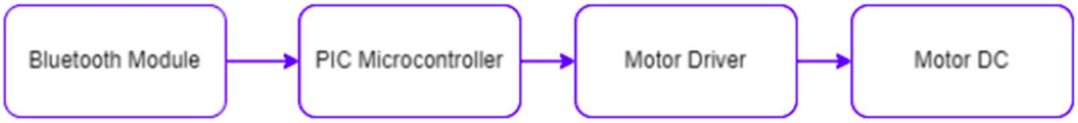
We installed bed on a chassis of a car to move the bed and used L298N to drive two motors of the car. Car can go forward, backward, right and left with varying speed.

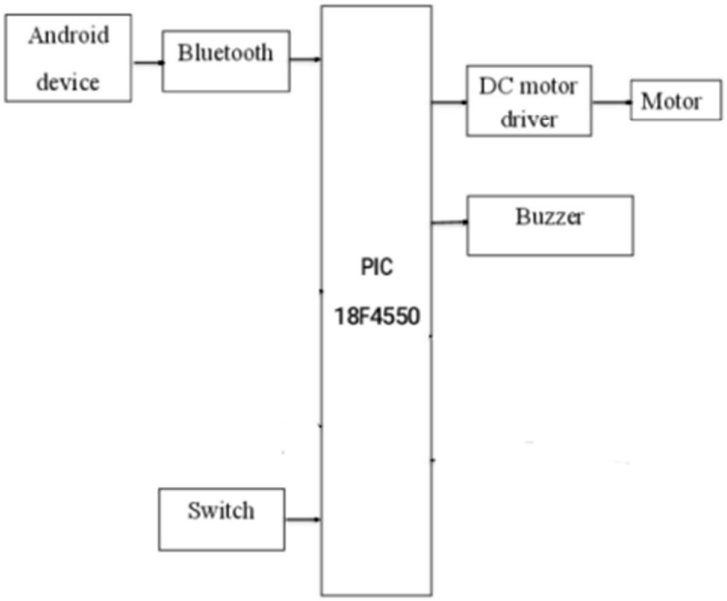
For the bed we again used two separate motors for leg side and headrest and connected the setup with the motor driver

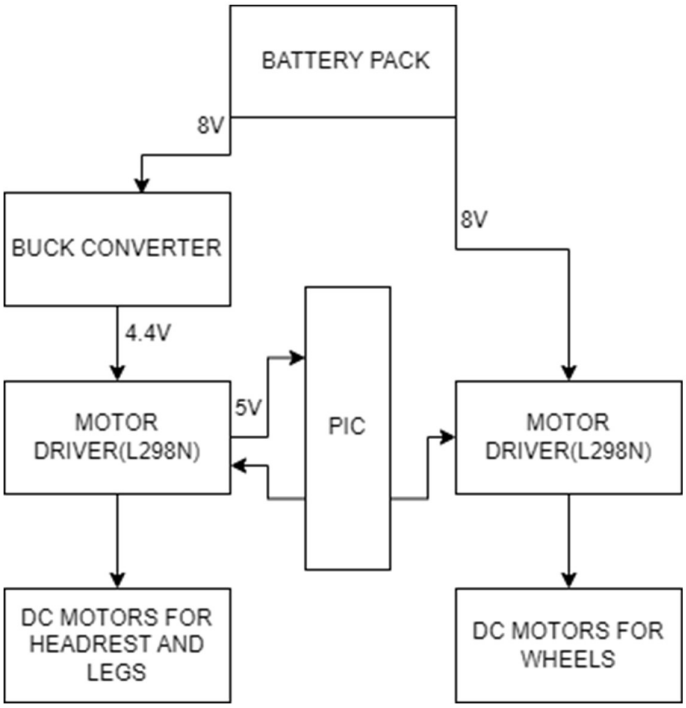
To control the speed of bed motors we used a buck converter to lower the input voltage. Battery pack is being used to power the circuit.

- **Block Diagram of the circuit**

Below are block diagrams of the circuit.







- **Code discussion:**

  In this project the PIC micro-controller is programmed to communicate with the Bluetooth and give the connection commands. Then it analyses the data and sends the orders to the controller of the electric bed to actuate the motors.

  The bed is moved by using a DC motor controlled by a micro-controller. Every time the up/down button is pressed, the micro-controller directs the DC motor to move the bed to reach 10 degree and is set for maximum 60 degree.

  UART and PWM duty is used in PIC code. RC car controller application is being used for mobile. Multiple 'if' conditions are being used to enable buttons and drive motors. For speed, PWM duty is set to half for slow speed and to full for high speed.

- **Results and discussion:**

  The result is a wireless controlled moving patient bed with features including different motions of bed and its translocation.

Conclusion

Our project was a massive success for us. The result was more than our expectations. Our instructor praised us, and it motivated us. While working on this, we faced different situations in designing the hardware and learned how to manage these situations. Our primary motivation for this project was to introduce a solution to patients so they could change their sitting posture with just a touch of a button.

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