Active Suspension System Test Platform (hardware)

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Overview:

The Active Suspension System Test Platform will consist of a voltage controlled linear actuator to control the movement of a test bed platform based on inputs provided by the user interface. The control system will ensure that the platform will move in a vertical fashion with the desired displacement. The system will consist of hardware that controls the actuator and a feedback network, and control software.

Initially, the hardware system will receive inputs through the microcontroller keypad to obtain the desired vertical displacement information. The output of the system will simply be platform motion between the desired maximum and minimum position of the platform, while the state of the platform will be shown on the microcontroller LCD display. Figure 1 below, is the initial system block diagram:
Inputs and Outputs (initial system):

<table>
<thead>
<tr>
<th>Microcontroller Inputs</th>
<th>Microcontroller Outputs</th>
<th>Platform Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>User input indicating vertical displacement</td>
<td>LCD display</td>
<td>Various vertical displacement</td>
</tr>
</tbody>
</table>

If time permits, a feedback control portion developed by Jerry Campbell will be implemented into the initial system. The hardware system with feedback control shown in figure 2, will have the ability to provide different specified waveforms by virtue of the closed loop system. The closed loop system will monitor the behavior of the linear actuator to ensure the desired motion is generated. The load weight of the system will affect
the behavior of the linear actuator platform. For example, a load weight of 200 pounds will significantly affect the platform motion when compared to the system containing no load.

![System Block Diagram with Feedback Control](image)

**Figure 2: System Block Diagram with Feedback Control**

**Inputs and Outputs (system with feedback control):**

<table>
<thead>
<tr>
<th>Microcontroller Inputs</th>
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<th>Platform Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>User input indicating actuator movement</td>
<td>LCD display</td>
<td>Various vertical displacement</td>
</tr>
<tr>
<td>Feedback sensor</td>
<td></td>
<td>Various frequencies</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Various waveforms</td>
</tr>
</tbody>
</table>
**Parts:**

- Platform
- DC or AC motor
- Screw Linear Actuator
- Microcontroller
- Keypad
- Display
- Feedback Sensor

Below are specifications that have been set based on research that have been completed thus far and figure 3 shows the actuator platform orientation:

**Specifications:**

- Platform vertical displacement of twelve inches
- Platform speed of twenty inches per second
- Load capacity of two hundred pounds
Figure 3: Actuator Platform Orientation