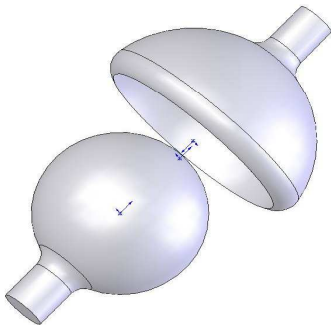
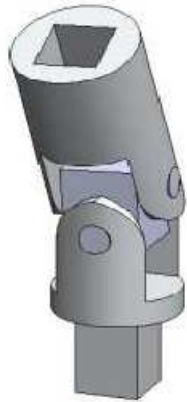


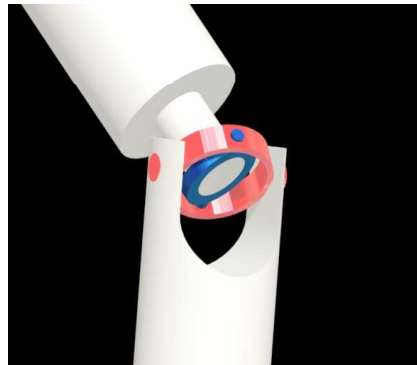
| P09029 - Wrist                     |        | Concepts                       |                |                        |                |                  |                |                      |                |                     |                |
|------------------------------------|--------|--------------------------------|----------------|------------------------|----------------|------------------|----------------|----------------------|----------------|---------------------|----------------|
|                                    |        | A<br>(reference)<br>Ball Joint |                | B<br>Flexible Material |                | C<br>4-Pin Joint |                | D<br>Gyroscope Joint |                | E<br>Two Pin Joints |                |
| Selection Criteria                 | Weight | Rating                         | Weighted Score | Rating                 | Weighted Score | Rating           | Weighted Score | Rating               | Weighted Score | Rating              | Weighted Score |
| Realism (accurate to human motion) | 20%    | 3                              | 0.6            | 2                      | 0.4            | 3                | 0.6            | 3                    | 0.6            | 2                   | 0.4            |
| Feasibility                        | 20%    | 3                              | 0.6            | 1                      | 0.2            | 5                | 1              | 2                    | 0.4            | 4                   | 0.8            |
| Cost                               | 10%    | 3                              | 0.3            | 5                      | 0.5            | 2                | 0.2            | 3                    | 0.3            | 4                   | 0.4            |
| Adaptability                       | 10%    | 3                              | 0.3            | 2                      | 0.2            | 3                | 0.3            | 3                    | 0.3            | 3                   | 0.3            |
| Structural integrity               | 20%    | 3                              | 0.6            | 1                      | 0.2            | 2                | 0.4            | 1                    | 0.2            | 4                   | 0.8            |
| Range of motion                    | 20%    | 3                              | 0.6            | 5                      | 1              | 3                | 0.6            | 3                    | 0.6            | 2                   | 0.4            |
| Total Score                        |        |                                | 3              |                        | 2.5            |                  | 3.1            |                      | 2.4            |                     | 3.1            |
| Rank                               |        |                                | 2              |                        | 3              |                  | 1              |                      | 4              |                     | 1              |
| Continue?                          |        |                                |                |                        |                |                  | yes            |                      |                |                     | yes            |



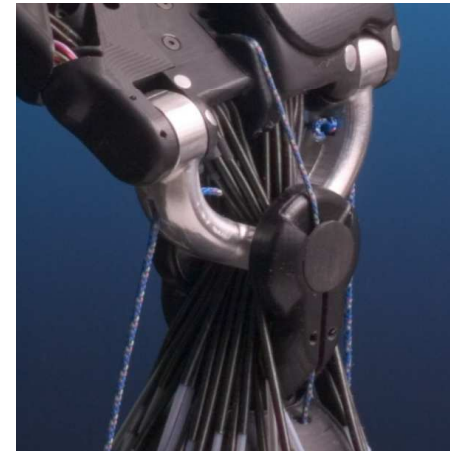
Concept A



Concept C

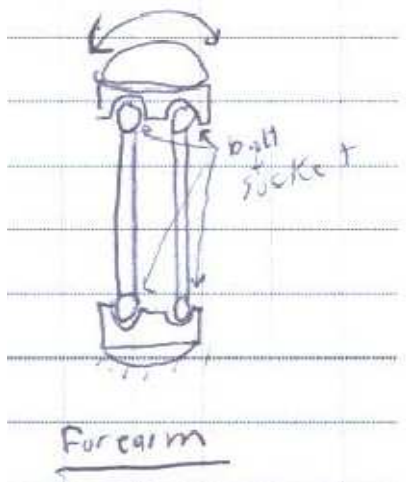


Concept D



Concept E

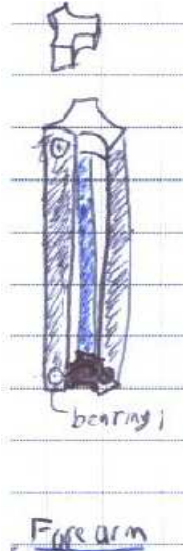
| P09029 - Forearm                   |        | Concepts                                           |                   |                              |                   |                        |                   |                        |                   |
|------------------------------------|--------|----------------------------------------------------|-------------------|------------------------------|-------------------|------------------------|-------------------|------------------------|-------------------|
|                                    |        | A<br>(reference)<br>Two rods with ball<br>bearings |                   | B<br>Solid Rod<br>w/Bearings |                   | C<br>3 Bars that twist |                   | D<br>Flexible Material |                   |
| Selection Criteria                 | Weight | Rating                                             | Weighted<br>Score | Rating                       | Weighted<br>Score | Rating                 | Weighted<br>Score | Rating                 | Weighted<br>Score |
| realism (accurate to human motion) | 20%    | 3                                                  | 0.6               | 2                            | 0.4               | 1                      | 0.2               | 2                      | 0.4               |
| feasibility                        | 20%    | 3                                                  | 0.6               | 5                            | 1                 | 4                      | 0.8               | 1                      | 0.2               |
| cost                               | 10%    | 3                                                  | 0.3               | 5                            | 0.5               | 3                      | 0.3               | 4                      | 0.4               |
| adaptability                       | 10%    | 3                                                  | 0.3               | 3                            | 0.3               | 2                      | 0.2               | 2                      | 0.2               |
| structural integrity               | 20%    | 3                                                  | 0.6               | 4                            | 0.8               | 2                      | 0.4               | 1                      | 0.2               |
| range of motion                    | 20%    | 3                                                  | 0.6               | 5                            | 1                 | 2                      | 0.4               | 5                      | 1                 |
| Total Score                        |        |                                                    | 3                 |                              | 4                 |                        | 2.3               |                        | 2.4               |
| Rank                               |        |                                                    | 2                 |                              | 1                 |                        | 4                 |                        | 3                 |
| Continue?                          |        |                                                    |                   |                              | Yes               |                        |                   |                        |                   |



Concept A

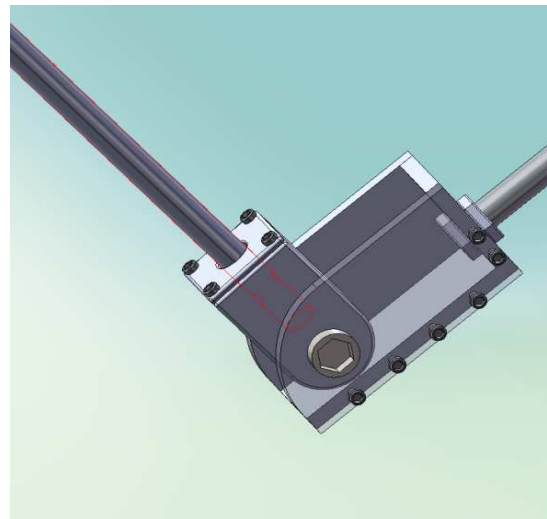


Concept B



Concept C

| <b>P09029 - Elbow</b>              |        | <b>Concepts</b>                       |                |                                |                |                                |                |
|------------------------------------|--------|---------------------------------------|----------------|--------------------------------|----------------|--------------------------------|----------------|
|                                    |        | <b>A<br/>(reference)<br/>Pin Join</b> |                | <b>B<br/>Flexible Material</b> |                | <b>C<br/>Ball &amp; Socket</b> |                |
| Selection Criteria                 | Weight | Rating                                | Weighted Score | Rating                         | Weighted Score | Rating                         | Weighted Score |
| realism (accurate to human motion) | 20%    | 3                                     | 0.6            | 1                              | 0.2            | 2                              | 0.4            |
| feasibility                        | 20%    | 3                                     | 0.6            | 1                              | 0.2            | 2                              | 0.4            |
| cost                               | 10%    | 3                                     | 0.3            | 5                              | 0.5            | 2                              | 0.2            |
| adaptability                       | 10%    | 3                                     | 0.3            | 2                              | 0.2            | 2                              | 0.2            |
| structural integrity               | 20%    | 3                                     | 0.6            | 1                              | 0.2            | 3                              | 0.6            |
| range of motion                    | 20%    | 3                                     | 0.6            | 5                              | 1              | 5                              | 1              |
| Total Score                        |        |                                       | 3              |                                | 2.3            |                                | 2.8            |
| Rank                               |        |                                       | 1              |                                | 3              |                                | 2              |
| Continue?                          |        |                                       | Yes            |                                |                |                                |                |

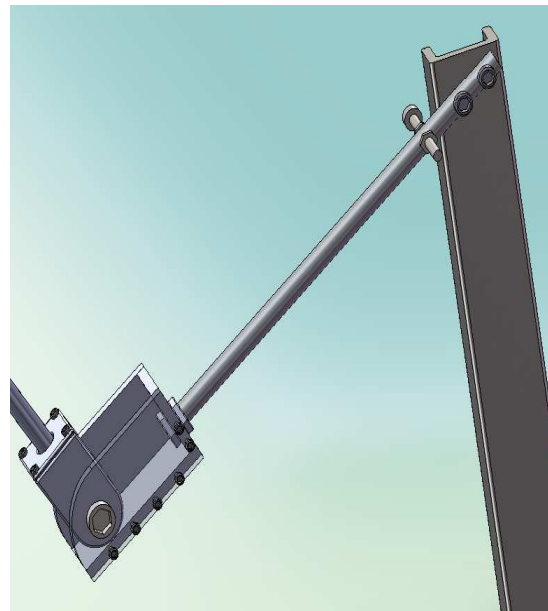


**Concept A**

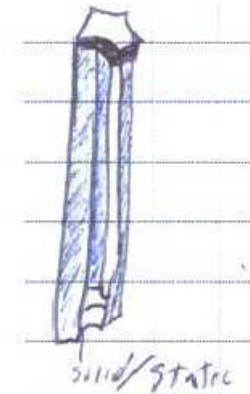
| P09029 - Upper Arm                 |        | Concepts                           |                |                 |                |                 |                |
|------------------------------------|--------|------------------------------------|----------------|-----------------|----------------|-----------------|----------------|
|                                    |        | A<br>(reference)<br>Solid Cylinder |                | B<br>Single Rod |                | C<br>Exoskelton |                |
|                                    |        | Rating                             | Weighted Score | Rating          | Weighted Score | Rating          | Weighted Score |
| Selection Criteria                 | Weight |                                    |                |                 |                |                 |                |
| realism (accurate to human motion) | 25%    | 3                                  | 0.75           | 3               | 0.75           | 2               | 0.5            |
| feasibility                        | 30%    | 3                                  | 0.9            | 3               | 0.9            | 2               | 0.6            |
| cost                               | 10%    | 3                                  | 0.3            | 5               | 0.5            | 2               | 0.2            |
| adaptability                       | 10%    | 3                                  | 0.3            | 3               | 0.3            | 3               | 0.3            |
| structural integrity               | 25%    | 3                                  | 0.75           | 2               | 0.5            | 2               | 0.5            |
| Total Score                        |        |                                    | 3              |                 | 2.95           |                 | 2.1            |
| Rank                               |        |                                    | 1              |                 | 1              |                 | 2              |
| Continue?                          |        |                                    |                |                 | Yes            |                 |                |



Concept A



Concept B

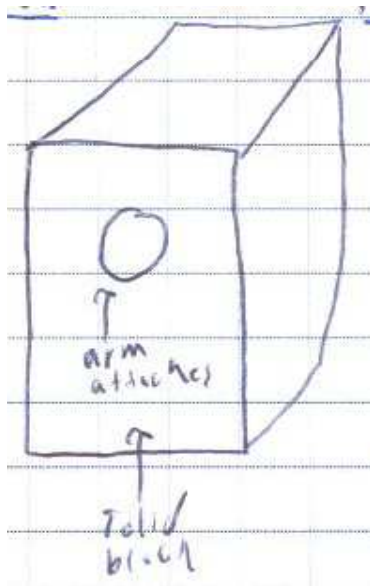


solid/static

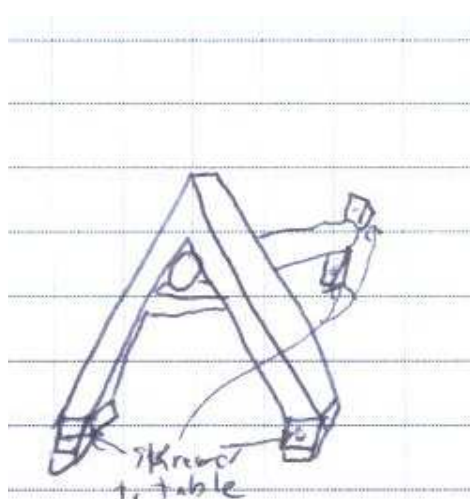
Upper Arm

Concept C

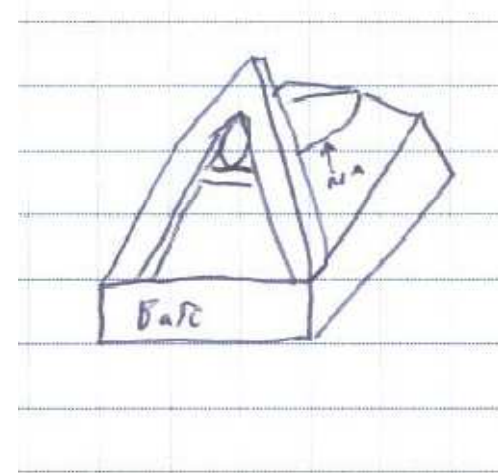
| P09029 - Base                      |             | Concepts                              |                |                                      |                |                                         |                |
|------------------------------------|-------------|---------------------------------------|----------------|--------------------------------------|----------------|-----------------------------------------|----------------|
|                                    |             | A<br>(reference)<br>Solid Metal Block |                | B<br>Metal Frame<br>/weighted bottom |                | C<br>Metal Frame<br>attached to a table |                |
| Selection Criteria                 | Weight      | Rating                                | Weighted Score | Rating                               | Weighted Score | Rating                                  | Weighted Score |
| realism (accurate to human motion) |             |                                       |                |                                      |                |                                         |                |
| feasibility                        | 40%         | 3                                     | 1.2            | 5                                    | 2              | 4                                       | 1.6            |
| cost                               | 40%         | 3                                     | 1.2            | 4                                    | 1.6            | 5                                       | 2              |
| adaptability                       | 20%         | 3                                     | 0.6            | 3                                    | 0.6            | 2                                       | 0.4            |
| structural integrity               | 40%         | 3                                     | 1.2            | 2                                    | 0.8            | 4                                       | 1.6            |
|                                    |             |                                       |                |                                      |                |                                         |                |
|                                    |             |                                       |                |                                      |                |                                         |                |
|                                    | Total Score |                                       | 4.2            |                                      | 5              |                                         | 5.6            |
|                                    | Rank        |                                       | 3              |                                      | 2              |                                         | 1              |
|                                    | Continue?   |                                       |                |                                      | Yes            |                                         | Yes            |



Concept A



Concept B



Concept C

# P09029 - Control System

|                     |        | Concepts                            |                   |              |                   |                                             |                   |
|---------------------|--------|-------------------------------------|-------------------|--------------|-------------------|---------------------------------------------|-------------------|
|                     |        | A<br>MATLAB/Simulink<br>(reference) |                   | B<br>LabVIEW |                   | C<br>Embedded<br>Design<br>Micro-Controller |                   |
| Selection Criteria  | Weight | Rating                              | Weighted<br>Score | Rating       | Weighted<br>Score | Rating                                      | Weighted<br>Score |
| Robustness          | 35%    | 3                                   | 1.05              | 5            | 1.75              | 5                                           | 1.75              |
| Adaptability        | 15%    | 3                                   | 0.45              | 4            | 0.6               | 3                                           | 0.45              |
| Feasibility         | 10%    | 3                                   | 0.3               | 4            | 0.4               | 3                                           | 0.3               |
| Ease of Use         | 20%    | 3                                   | 0.6               | 4            | 0.8               | 1                                           | 0.2               |
| Intuitive Interface | 20%    | 3                                   | 0.6               | 4            | 0.8               | 1                                           | 0.2               |
| Total Score         |        |                                     | 1.95              |              | 2.6               |                                             | 1.15              |
| Rank                |        |                                     | 2                 |              | 1                 |                                             | 3                 |
| Continue?           |        |                                     |                   |              | Yes               |                                             |                   |