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**Sensor Report**

 The sensor array for “Off-belay” is not extremely elaborate. “Off-belay” is more of a mechanical project and for that reason the student attempted to make only the mechanical aspect of the robot difficult. The sensor sweet consists of the following:

|  |  |
| --- | --- |
| Sensor | Number |
| Sharp GP2Y0A21YK Package (IR Sensor)  | 3 |
| Devantech SRF05 (Sonar)  | 2 |
| Wixley Digital Angle Gauge WR300 (Digital Angle)  | 1 |
| SPDT Switch with .75” roller (Bump Switch w/Roller)  | 1 |

**IR Sensors**

The IR sensor chosen for the robot is the Sharp GP2Y0A21YK Package. The sensor has an operating range of 4” to 30”. This will obviously change in relation to the lighting in the room and other factors such as temperature and humidity. The IR sensors are lined up in a row, all on the front of “Off-belay”. They are used for centering of the structure to be ascended. Since the structure is a control variable its diameter will never change. For this reason it is possible to place the two outside IR sensors to where they will be just outside the diameter. If neither sensor gives a value while the middle sensor does, then theoretically the pole should be centered.

**Sonar Sensors**

A total of three sonar sensors are used on “Off-belay”. Two sensors in the front are used for “seeing”. Reverse obstacle avoidance is used for these two sensors. They actively seek out the structure to climb. The third sonar sensor is placed on the bottom of the platform. This sensor is activated when the bump switch gives a value, and thus begins to log values. It returns the values to the LCD, where the height of the climb is logged.

**Digital Angle**

The digital angle will be used to determine whether the robot is ascending the pole in a fairly straight manner. If the angle gives a value other than 180° the microcontroller will adjust the power to the motor on the opposite side in order to straighten “Off-belay” out. There is a resolution of .1° which is taken into account in the tolerance of when the microcontroller actuates the opposite motor.

**Bump Switch**

The IR, sonar, and digital angle are all connected to the bump switch in some manner. The bump switch is located on the front of the robot and when it returns a value for the first time the robot will be pressed against the pole. This will initiate the closing of the pincer mechanism. Because the bump switch has a roller attached to it, it is able to return values throughout the duration of the climb. As long as the switch is returning values the sonar facing down will also be returning values. The digital angle will only be measured when the bump switch is pressed. The IR sensor in the middle will no longer be used for centering the pole, instead it will do “End of the World” detection.