# Special Sensor Report

**James Landry**
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**EEL5666**
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**A. Antonio Arroyo**

## Abstract

I am proposing to build a robot that will locate a rope, wooden dowel or other similar device. It will attach itself and ascend until it recognizes that it cannot climb anymore. It will measure the distance that it has climbed, and report the distance via speech. It will then descend safely to the bottom where it will detach itself and go about looking for another similar device to climb. It will carry out obstacle avoidance, ignoring any obstacles that it is unable to climb.

## Special Sensor

My special sensor is a sensor to detect if an object is capable of being climbed. In my demonstration, I am using a rope. The sensor uses two Sharp GP2D120 IR emitter detector pairs (see figure 1), positioned in such a configuration to allow a rope to become undetected if positioned in a one half inch area between the sensors, allowing the robot to approach the rope in such a way to climb it ( See figure 2). It will only allow objects of the ropes diameter, about one and a half inches, to pass into the climbing mechanism, objects bigger than this will be handled by the obstacle avoidance subroutine.

The code works as follows (code fragment id figure 3). If an object enters the field of vision of one of the IR detectors, than the robot attempts to position it in the blind spot by turning until it disappears. It then continues forward. If the object is again detected by one of the two IR detectors, then it is again realigned into the blind spot. It then continues forward until the rope is passed into the climbing area where a break beam sensor is triggered to recognize that it is ready to be climbed.

The Sharp sensor was purchased from Acroname for $13.50. The sensor takes a continuous distance reading and reports the distance as an analog voltage with a distance range of 4cm (~1.5") to 30cm (~12"). The interface is 3-wires with power, ground and the output voltage and requires a JST 3-pin connector which is included with each detector package. Each package also includes a booklet that contains specifications, that describes plugging together the connector, interfacing the detector, and application notes describing how to use the GP2D120.
The website address is as follows http://www.acroname.com/robotics/parts/R146-GP2D120.html

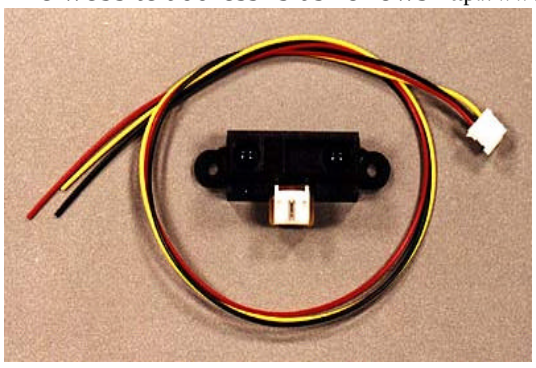

**fig. 1 Sharp GP2D120**

**fig. 2 Configuration of sensors to allow blind spot.**

**Fig. 3 code fragment**

```
//NB! This fragment was taken from main loop, polling all sensors to determine behavior
else if((read_adc(3)  > 500) && (read_adc(6)  < 500))        //right front sensor triggered
{
            OCR1AL=0;                                 //stop
            OCR1BL=0;
            delay_ms(50);                             //wait 50 ms

           while((read_adc(3)  > 500) && (read_adc(6)  < 500))       //while right front sensor triggered, turn left
           {
                      OCR1AL=100;      //turn left, till sensor does not detect anymore then continue straight
                      OCR1BL=0;
           }
           OCR1AL=0;                     //stop
           OCR1BL=0;
           delay_ms(50);                 //wait 50 ms
 }
else if((read_adc(6)  > 500) && (read_adc(3)  < 500))        //left front sensor triggered
{
            OCR1AL=0;                     //stop
           OCR1BL=0;
           delay_ms(50);                 //wait 50 ms
           while((read_adc(6)  > 500) && (read_adc(3)  < 500))       //while left front sensor triggered, turn right
           {
                      OCR1AL=0;          //turn right, then continue straight
                      OCR1BL=100;
           }
           OCR1AL=0;                     //stop
           OCR1BL=0;
           delay_ms(50);                 //wait 50 ms.
}
```