Lab03 – Hill Climb

Introduction:

One of the most widely used control systems is called a PID control loop feedback system. The role of a PID control loop is to continuously measure the difference between input signal and target point, also known as error function. Such an error function enables us to move closer to the target point in a continuous manner. PID has three components: proportional, integral, and derivative. Here is a mathematical formula that describes it.

$$u(t) = K_p e(t) + K_i \int e(T)dT + K_d \frac{d}{dt} e(t)$$

$K_p, K_i \; and \; K_d$ are gain parameters

In this lab you will be given an inclined surface Your robot must be able to use the readings of the accelerometer on the myRio and a PID control loop to navigate to the top of the hill. You must use the cliff sensors to not let the robot fall off, but you may not hog the edges to climb up. Moreover, there will be obstacles in the way which your robot should be able to circumvent (using whatever algorithm you prefer). Detect these obstacles simply when the bumper sensors collide with them.

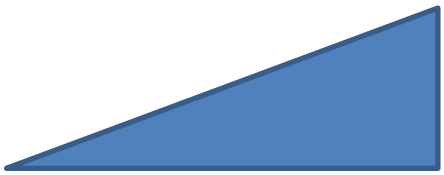

Figure 1

Deliverables:

- Detailed state machine of your design
- Choice of your tuning parameters and reasoning behind it ($K_p, K_i \; and \; K_d$)
- Demo