# Control System

## Choosing a Control System

In choosing a processing unit for the control system, the criteria most concerning the device are speed, programming difficulty and cost. The table below highlights the options available in a general sense.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Programming  Difficulty | Speed | Power | Cost | Display |
| 8/ 16 bit microcontroller | Moderate | Fast  ~20MHz | Low  <1W | ~$50 | Difficult to add |
| 32 bit microcontroller | Moderate | Very fast  ~600MHz | Low  1-5W | ~$150-400 | Possible |
| 32 bit x86 microcontroller (PC) | Easy/moderate | Slow/fast  (depending on OS) | High  <50W | ~$150-500 | Easy to add |

How fast of a microcontroller do we need? We know that the system as a whole must update at a rate of at minimum 1kHz.

Lookup table?

## Determining the PID Gains

## Determining the Accuracy

The accuracy of the robot is determined by the amount of error produced by the control system from the input to the output. The following diagram depicts all the possible errors involved.

encoder

Compute

position

Error 1

Compute

blocker

Error 4

Error 3

Error 2

motor

Motor controller