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CS 5780

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Lab 8 Pre-Lab

1. What is the difference between a continuous-time and discrete-time system?

Continuous-time systems have a theoretically infinite time resolution, or in other words there is no minimum unit of time that cannot be divided further where a result can’t be calculated. Discrete-time systems on the other hand operate only on periodic intervals.

1. How does fixed-point represent decimal values?

In fixed-point, a virtual decimal point is placed in the variable’s bits. Any bits above the decimal point represent integers; the others below represent the fractional value.

1. In the discrete first-order integral equation in the lab, what does the input value x[n] represent when used in the integral portion of a PI control system?
   * Hint: Look at the equation of the PID, what's being integrated there?

X[n] represents the first order equation that we solved for in Lab 7.

1. The specific motor used in the lab has a gearbox on the output. What is the internal motor's speed when the output shaft is rotating at 125 RPM?

The internal motor’s speed needs to be around 6250 RPM to reach the desired output shaft speed of 125 RPM. 200 RPM Output = 10000 Internal, so 10000/200 = 50:1 so 50 \* 125 = 6250

1. How many encoder counts will you get per second at a output shaft rotation of 125 RPM?

You would need to get about 406250 encoder counters per second if you have an output shaft speed pf 125 RPM. 650000 encoder counts as we have a 10000 RPM internal so 65 encoder counters per 1 internal RPM. So 65\*6250 = 406250.

1. How do you control the speed of the motor using the H-Bridge?

You use the H-bridge enable pin. When the pin is set to low the driver is disabled and essentially disconnected from the motor. By connecting the pin to a PWM output, you can approximate driving the motor with an analog voltage, so as you increase the voltage the speed increases.

1. What I/O structure types on the STM32F0 are 5V tolerant?

There are two types that are 5V tolerant FT and FTf types.