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Requirements Spec

Phase I

* The user interface must allow a user to interact with the system
* Local node must transmit a speed or control command to the remote node
  + Receive Commands from local node
  + Local node commands are used to control motor movement.
* Remote node must transmit present speed of the motor to the local node
* The remote node must interpret the speed given by the local node and actuate the motor at the given speed
* The remote must communicate the status of the motor, including any error conditions to the local node
* In the event an error condition occurs, the remote must default to a safe state
* The local node must display the current motor state

Design Spec

* Nodes must communicate using the I2C protocol
* The connection to the User terminal must use the EIA-232 serial communications protocol
* User Interface must allow the following functions: start, stop, specify value, increment, decrement
* User must be able to increment the motor speed by ±0.5%
* Unless instructed to increase motor speed, the remote node must maintain the currently set speed
* The remote must control the motor using a PWM signal with frequency 20.00kHz.
* The motor must have a input voltage range of 0.0V to 5.0VDC
* The error states are defined by the three classes:
  + ±5.0% - level 0 –severe
  + ±2.0% - level 1 – moderate
  + ±1.0% - level 2 –of concern
* When an error state occurs, the Remote node must take the following steps to put the motor into a known safe state:
  + Severe:
  + Moderate:
  + Of concern:

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Failure Mode Analysis

* Local Node
  + Chip placed backwards
  + Incorrect Pins / Wiring
  + Bad User Input
  + RS232 Noise
  + RS232 connection problems
  + Given misformatted data
  + I2C bus connection problems
* Remote Node
  + Incorrect Pins / Wiring
  + Misreads voltage (faulty ADC)
  + Problems reading the I2C bus from excessive noise
  + Incorrect clock speed / unable to read clock
  + Given misformatted data

Test Plan

* Remote Node
  + Sets to specific position
  + Correctly reads position
  + Receive signal and correctly moves in increments of 0.5%
  + Reads current position correctly
  + When motor is obstructed and slowed down, warnings and alarms are noticed
  + I2C connection to Local Node is working
* Local Node
  + Parses commands from RS232 connection
  + Sends correct command to Remote node
  + I2C connection to Remote Node is working
  + RS232 connection is working
  + Handles warning/alarm data from Remote Node properly