PyMata Design Details

1 PyMata Classes

PyMata consists of 3 classes, PyMata, PyMataCommandHandler, and PyMataSerial. PyMata uses 3 threads of operation. One to receive data from the Arduino, one to process that data and the third to process API calls.

1.1 Pymata

This class is the "main" class of the program. It instantiates the other classes and contains the methods to satisfy calls to the API. Data returned through the API is not filtered, but is the raw data provided by Firmata. For analog reads, the range of data is 0-1024. For Analog (PWM) writes, the range of values provided by the user is expected to be in the range of 0-255.

1.2 PyMataSerial

This class provides the data transport mechanism for communication with the Arduino microntroller. Currently, this is accomplished over a USB serial connection. This class runs a separate thread dedicated to receiving data from the Arduino. As soon as this thread detects an available character it places the character into the command_deque. The deque will automatically grow when needed to, to assure no data is lost. The deque is thread safe, so there is no blocking required. Using a separate thread assures that data is received as fast as possible.

1.3 PyMataCommandHandler

The main function of this class is to process data received from the Arduino placed on the command_deque. Data removal and interpretation is performed in a separate thread. For each potential Firmata message that may be received, an entry is made into the command_dispatch table in the form of a map. Firmata commands are used as keys into the table. The value associated with each key consists of a "reference" to the method that processes the command and the number of data items that processing this command requires.

This class also maintains a separate "response" table for digital and analog pins. These tables contain an entry for each pin of the Arduino. Each entry contains the pin mode, and the last data value reported by Firmata in an Analog or Digital Firmata message (input pins only). These tables use a thread lock to guarantee data integrity.