Custom LEDs for FTC

LED Controller Variety

- REV Robotics Blinkin
  - http://www.revrobotics.com/rev-11-1105/
  - $56.00 with 1m strip of 5V LEDs
- I2C to SPI Bridge
  - https://sandboxelectronics.com/?product=sc18is602-i2c-to-spi-bridge-module
  - https://www.adafruit.com/product/2239?length=1
  - $45.00 with 1m strip of DotStar LEDs

REV Blinkin

- Easy – No programming needed
  - Can setup patterns using only the Blinkin controller
  - Programming only needed to switch patterns during OpMode
- High Performance – Microprocessor makes patterns smooth and seamless
  - Pattern is built into Blinkin controller and played back by a dedicated microcontroller.
- Low Impact – Changing LED patterns is very small I2C command, low impact on OpMode
  - Changing LED pattern as simple as programming a servo.
- Large Pattern Selection – 100 built in patterns
  - Built in patterns are largely unique and provide an excellent amount of bling.
- Low Customization – No ability to create custom displays
  - Built in patterns are the only thing that can be displayed.
  - Hard to signal more than 1 thing from robot to driver team.

REV Blinkin Example Practical Usage

- Autonomous Program Selection - Select a red or blue pattern to show proper selection of autonomous.
- Endgame Timing – Display a specific pattern during endgame to show driver team they need to perform endgame action.
- Robot State – Single display of a state showing the robot performed an action. Example Rover Ruckus display 2 elements collected.
- Looking Cool – Just pick a favorite pattern and let it go. Just makes the robot look more interesting.

I2C to SPI Bridge

- More Customizable
  - LEDs are individually set to any color.
  - Any number of signals can be done from robot to driver team.
- More DIY
  - Cables and connectors are not FTC standard.
- More OpMode Effect
  - Programming LED strips require LED light data transfer. Causes ~5 mSeconds OpMode communication.
- Slower Refresh Rate
  - Pattern refresh rate is much slower than a dedicated microprocessor.

I2C to SPI Bridge Example Practical Usage

- Multiple State Signaling – Robot can communicate to drive team multiple states simultaneously. Example Rover Ruckus display individual element collection as well as element type.
- Detected Value Feedback – Use input range and detected value to display continuous change. Example battery voltage fade from green through yellow to red

Custom Pattern API

- I2C to SPI controller and LED software interface developed with several pre-done patterns.
  - https://github.com/rvansmith/Skystone
- Executing and customizing existing patterns is easily done.
- Pattern interface to develop new patterns
- Abstract pattern to make new patterns quickly implemented

Custom Pattern API

- Number of colors – The number of base colors that make up the pattern
- Pattern colors – An array list of the base colors that make up the pattern
- Pattern delay – A time in milliseconds between allowing updates to the pattern
- Pattern spacing – How many LEDs between repeating the pattern
- Measured value – An input value used to adjust range style patterns
- Update – Sets the LEDs based on the inputs