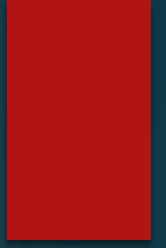


Custom LEDs for FTC



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