

Tune the Light and the Optical Fiber Cable

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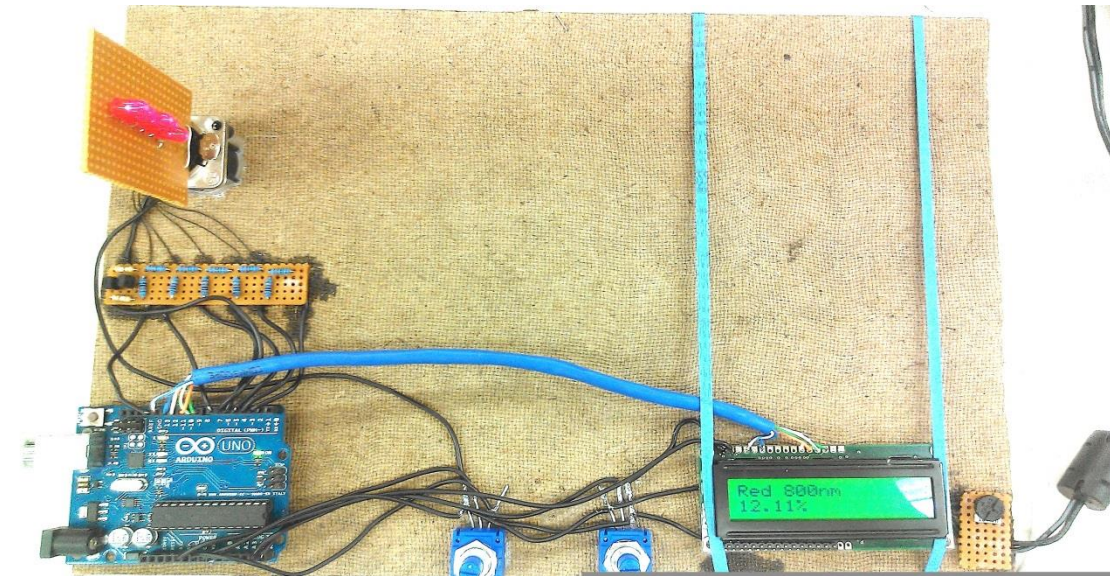
ECE 480

Team 13

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Abstract

In the Tunable light source project, the team design a prototype in the picture below.



It is really complicated to change the LED banks by hand, the team now is going to build a system to make this step easy. The team want to use the knobs and keyboard to combine with the LCD panel to control the system, and finally connect with the lens and optical fiber cable to get the light into right position.

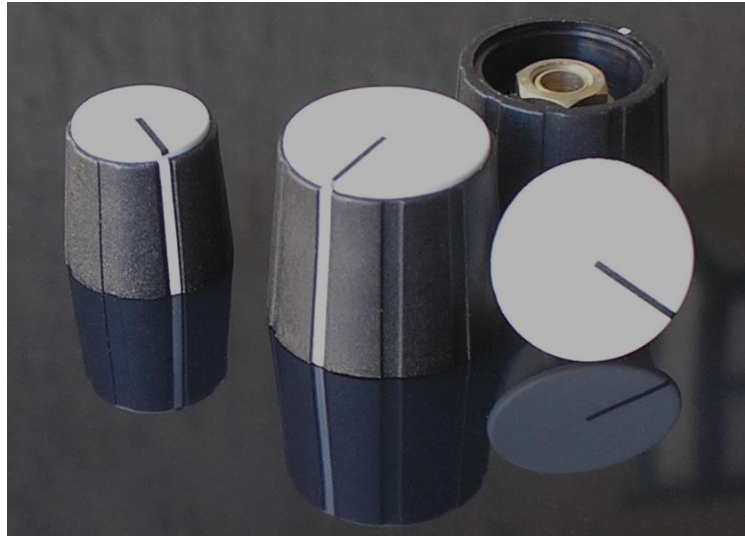
Introduction

Knobs: Or call it encoder in the project, a encoder is an electro-mechanical device that converts the angular position or motion of a shaft or axle to an analog or digital code.

Optical fiber cable: An optical fiber cable is a cable containing one or more optical fibers that are used to carry light. The optical fiber elements are typically individually coated with plastic layers and contained in a protective tube suitable for the environment where the cable will be deployed.

Background

Knobs(encoder):



The encoder signal data is compiled into usable signal communication, transmission and storage of the device. The angular displacement encoder or linear displacement into electrical signals, the former is called code disc. According to the encoder readout mode can be divided into contact and non-contact two; in accordance with the principle can be divided into incremental encoders and absolute categories. Incremental encoder is to displacement into a periodic electrical signal, and then transform the electrical signal into a counting pulse, represents the magnitude of displacement by the number of pulses. Absolute encoders determine each position corresponds to a digital code, so it only shows the value of the starting and ending position measurement, not relate to the middle of the process of measurement.

How to tune the light you want?

For example, if you want to get the blue light, you can rotate the wave length knob, and make the LCD show the wave length going to 400nm, so that you can get the blue light. And you can also use the other knob to control the light intensity you want, the LCD will show the percentage of the intensity.

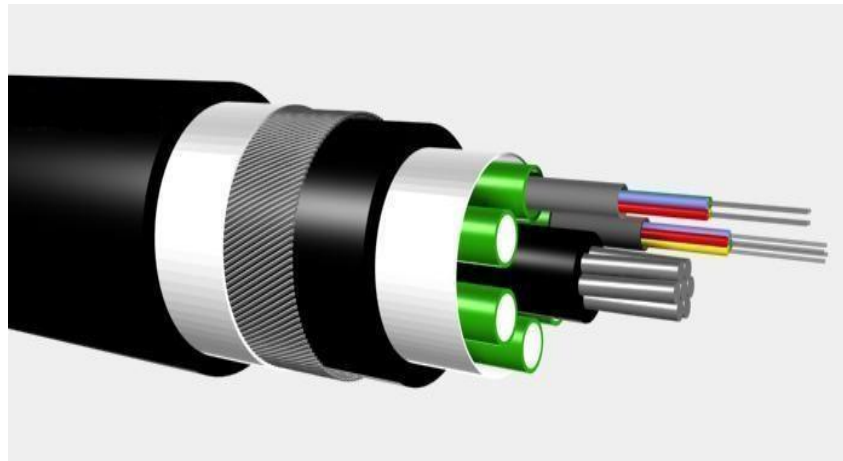
The team will combine the LCD with Knobs to show that when rotate the knobs, the team can get the right wave length match the lights' color.

For LCD: Typical LCD consists of a layer of molecules aligned between two transparent electrodes, and two polarizing filters parallel and perpendicular, the two filters are perpendicular to each other.

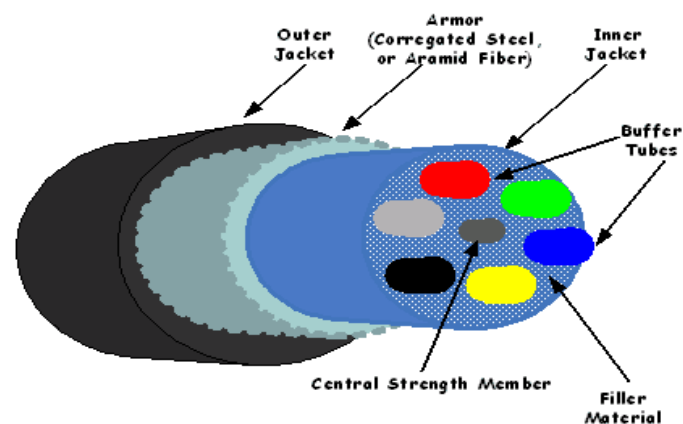


The picture above is the LCD we choose, it can show the color type, wave length, and the intensity.

Optical fiber cable:



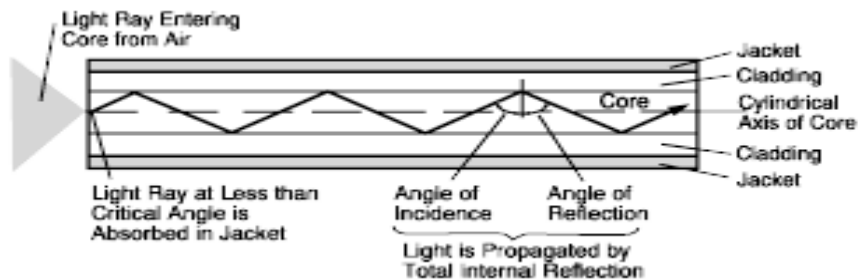
The basic structure of the cable is normally provided by the core, strengthen steel, fillers and jacket several components, in addition to necessary also waterproof layer, a buffer layer, insulated metal wires and other components.



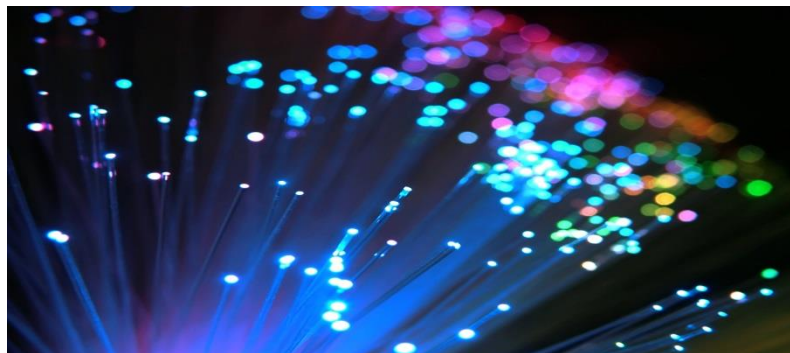
Cable by strengthening the core and the core, sheath and the outer sheath of three parts. The core structure of single and multi-core type two kinds: single type have full

type and control of two kinds; multi-core ribbon and units have two. Outer protective layer and two non-armored metal armor.

How the light spread in the Optical fiber cable?



By using the optical fiber cable, the team can get the spot in any direction they want. The optical fiber cable only have a very small power lose, so it will not affect the result of the measurement.



Conclusion:

For choosing the wavelength and light intensity, it is very straight forward, all the things you need to play with are knobs. By combine the LCD and the physical buttons, users can easily control the device. The optical fiber cables are the way we direct the light, users do not need much understand of that.

References:

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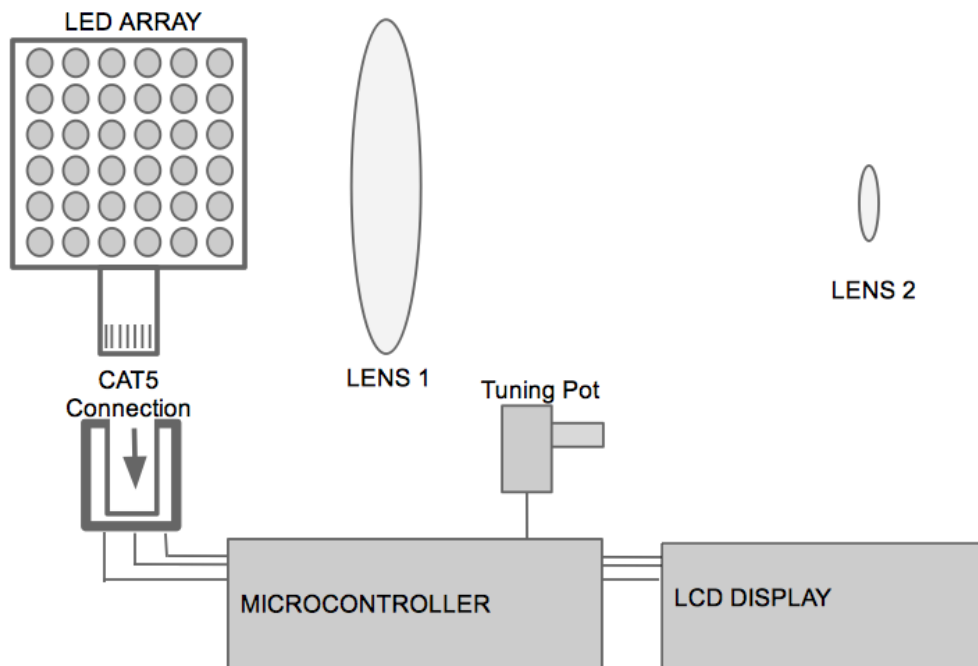
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<http://baike.baidu.com/link?url=LipXaQtm4XDjjLyKQQqQ8orEqiBce9D-PblaGCSyHEo1vYRuG9kK0AZfbJS7W51LlKEsg0pioMu8CtnxOsxapq>

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Appendix:



Original prototype

