

## **Development of a low cost optical spectrometer for visible region**

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A low cost modifiable spectrometer was developed for use in the spectral analysis. Light emerging from the source is focused using matching set of lenses on to two adjustable slits to collimate the beam. Then it was directed to the center of a concave mirror. The parallel light beam reflected by the concave mirror was allowed to fall on a 600 lines/mm transmission grating after passing through a wide slit to remove possible higher order Fraunhofer diffraction lines. The dispersed light beam was directed through a converging lens before it was detected by a linear photodiode sensor array to ensure a maximum collection of light falls on the detector. The linear photodiode sensor TSL1406R was interfaced to Arduino platform. A software application was developed to display a plot of Intensity versus corresponding pixel number on the computer screen while saving data to a text file. Standard light sources of Cadmium, Mercury, Sodium, and laser light were used to calibrate the spectrometer. After the calibration, a light spectrum from a Compact Florescent Lamp (CFL) was analyzed and found that the emission lines of the spectrum are in good agreement with their standard values up to a nanometer. Working spectral range is 398~755 nm and the observed spectral resolution for two neighboring CFL lines is 3.8 nm. The signal to noise ratio is about 30.2 for the laser peaked at 660.79 nm and the total construction cost is approximately Rs.12000 for the spectrometer.

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