Light intensity and power meter based on ldr and microcontroller

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Abstrak

A rapid increase in Sensor markets creates an optical sensor to be a best target for many researchers and scientists for their designing simplicity and easy implementation for a required task. Because of the breadth of optical bio applications, the challenges to design and functioning of an optical sensor for a particular task requires knowledge of optical, material, and environmental properties that affect sensor performance. This undergraduate thesis consists of experiments performed to develop a light intensity and power meter. This can be used to study the interaction between the optical signal and the target, the effect of the environment on propagation of the optical signal, methods to enhance the optical signal, and materials used to generate reliable optical source and to produce sensors with ultra high precision.
In optical market several light meters are available to measure luminance values in lux or footcandles. These state of the art light meters measure only the luminance of the area on which the light fall, and displayed over LCD screen. The system designed by the author of this report after performing experiments, follows the state of the art calibration procedure, by taking advantage of the inverse power law that the photo detectors obey to provide user with best accuracy in power and light intensity measurement with graphical user interface. The system provide two parallel sensor data streams feed directly to microcontroller and graphic user interface over serial communication port, hence providing a user with capability to re-modify formulas and other parameters accordingly in GUI. This experiment uses a light dependent resistor (LDR) as a light sensor to build a light intensity and power meter. The instrument uses microcontroller "Arduino" Atmega32 chip with 10 bit ADC resolution as a data measurement processing centre.
The results measured by data processing are displayed on LCD screen, and graph is plotted over GUI. With datasheet available on internet, few important parameters can be calculated such as speed response, working frequency, temperature effect and other losses for a microcontroller and sensor used in. The microcontroller is programmed to calculate and calibrate the input LDR value and display the calibrated data output over LCD screen. The system is also designed and programmed to provide serial communication interface for real time data plotting and data saving over various software like matlab, labview, excel, GUI etc.