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Arduino-Based Laser Communication

Authors : Simon Bambey, Edward Lim, Kai Corley-Jory, Pooya Taheri

Abstract : The main goal of this paper is to propose a simple and low-cost microcontroller-based laser communication link. To demonstrate that laser communication is a viable and efficient means for transmitting data, a transceiver capable of transfer rates of approximately 0.7 kB/s is prototyped. The hardware used for the transceiver consists of Commercial Off-The-Shelf (COTS) lasers, photodiodes, and the Arduino Mega 2560 which is an open-source and easy-to-use microcontroller-based platform intended for making interactive projects. A graphic user interface utilizing the Meteor framework is developed to facilitate the communication between the user and transceiver. The developed transceiver prototype is capable of receiving and transmitting data at significant ranges with no loss of information. Furthermore, stable and secure communication is achieved through several mechanisms developed to manage simultaneous sending and receiving, in addition to detecting physical interruptions during transmission. The design setup is scalable and with further development can be transformed into a fiber-optic transmission system. Due to its nature, laser communication is very secure and can provide a safe and private communication link. Overall, this paper demonstrates how laser communication can be an economical, durable, and effective means of information transfer.

Keywords : Arduino microcontrollers, laser applications, user interfaces, wireless communication
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