SSD Capsule Project Description
Fall 2024
Transferring Audio Information via Light

This project involves conversion of an audio signal to light, transfer of this audio-signal-containing light over a distance, and finally converting the optical signal back to audio signal. The system that you will design will be composed of four subsystems each of which shall be **fully analog**: i. Audio-receiving subsystem, ii. Light-emitting subsystem, ii. Light-sensitive subsystem, iv. Audio-generating subsystem.

In the audio-receiving subsystem, the audio input should be converted to an electrical signal. Your audio circuits should employ transistors and it should be fully analog (i.e., you are not allowed to use Arduino etc.). (BONUS: In case the audio signal is converted to an electrical signal using optical means, a bonus point of 15% will be added to the overall score).

In the light-emitting subsystem, you are asked to design a circuit to turn a light source on and off (or make the emitted light dimmer and brighter) in response to the audio signal that you received. You are expected to use a monochromatic light source.

In the light-sensitive subsystem, you are asked to utilize a photodetector. The photodetector should produce photocurrent due to the radiation from one of the light sources. Your system should work when the light-emitting and light sensitive subsystems are at least 50 cm apart from each other.

In the audio-generating subsystem, the signal obtained from the photodetector should be converted to an audio signal. Your purpose here is to recover the original audio signal. Note that your audio-generating circuits should employ transistors and again it should be fully analog (i.e., you are not allowed to use Arduino etc.).

You are expected to design your system and simulate the electronic circuits prior to the demo. This part will have a weight of 25%. The remaining part of the project grading will be based on an implementation demonstration (75%) where you will explain your design and show that your system works as intended.

One group is expected to consist of two or three people.

Design presentation (including simulation results of electronic circuits): Dec. 3, 2024
Demo: Dec. 24, 2024