EE 344 Project Proposal - Visible Light Communication using LED

Arka Sadhu - 140070011
Sudeep Salgia - 14D070011
Parth Kothari - 14D070019

November 2016

Contents

1 Abstract

We aim to develop a prototype of Visible Light Based Communication link. The project will consist of a transmitter, a LED in this case, which will transmit the message signal which will be received by the receiver. The received signal will then be burnt on a SD card.

2 Project Description

2.1 Background and Motivation

LiFi (Light Fidelity) is the new buzzword in new era of communication. Electronic Design Lab is giving us a great opportunity to explore this domain and all of us are enthusiastic to work on it , thus motivating us to take up this topic.

2.2 Project Goal

Our project aims to achieve the the following objectives in order to make a satisfactory prototype.

- Should transmit a file stored in a USB/SD card
- Transmission speed should be 1 Mb/s
- Blinking should not be detected by the naked eye
- Link should work over a distance of 40 cm

2.3 Project Specifications

3 Technical Design Description

3.1 Possible Solutions and Design Alternatives

3.2 System-level overview

4 Project Plan

Tasks to be done:

- Reading Literature →We will read a few papers regarding the implementation done by various researchers and institute. After reading them, we hope to achieve a DEEEEEEP understanding of the logistics behind the working of visible light communication. (2 weeks)
- Designing the Transmitter →As mentioned above, we will be using an LED to transmit the message. The circuit will be designed with proper biasing for efficient transmission (1 week)
- Designing the Receiver→This is relatively the tough part of the circuit. Along with proper biasing, effects of surrounding light need to be taken care of and finally clock synchronization and frequency offset problem will be tackled (3 weeks)
- DSP Board Coding →Code for the acquisition of signal, processing of signal and writing on the computer will be written on the DSP board. (1 week)
- Integration and Testing→After satisfactory implementation of individual components of the main circuit, they will be integrated and tested starting from lower speeds (10 kbps), problems will be identified and subsequently rectified. Finally, we aim to achieve the desired speed of 1 Mbps. (3 weeks)
- Buffer→1 week will be kept buffer to improve the efficiency of the system and tackle last minute debugging issues.

4.1 Work distribution

4.2 Gantt chart

5 Project Implementation

6 Deliverables

- By first week of February, we hope to get done with
  - Understanding Literature
  - Procurement of Components
  - Finishing the Transmitter Circuit

  - Getting Started with the Receiver

- By second week of March, we hope to accomplish
  - Finish Tackling the Problem of Clock Synchronization and Frequency offset
  - Start integrating the components.
- By first week of April, we hope to accomplish
  - After second evaluation, we get started with testing of the circuit. We will start off with 10 kbps, correct the errors which come in the way and in the end hope to get the desired speed of 1Mbps.