EE 344 Project Report 1 : Visible Light Communication using LED
Group No. B-05
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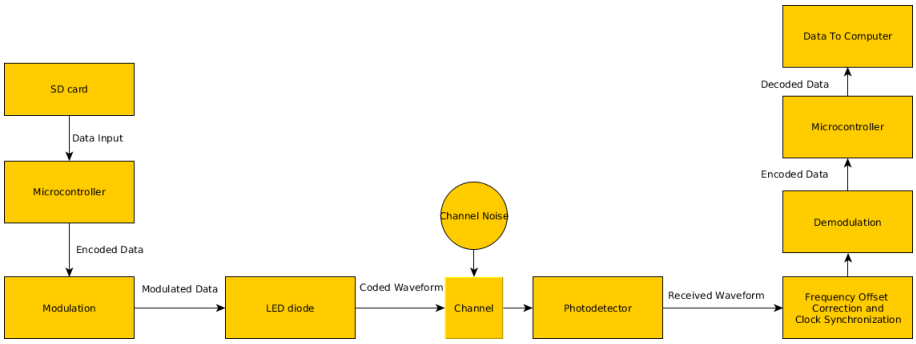
1 Work Promised

- Finish Tackling the Problem of Clock Synchronization and Frequency offset
- Start integrating the components.
- Code the modulation the demodulation schemes in the microcontroller

2 Work Accomplished

2.1 Block Diagram and Demonstration



2.2 Software Implementation

- Implemented Transmitter code with (On-Off Keying) OOK with the encoding scheme : $'0' \Rightarrow' 01'$ and $'1' \Rightarrow' 10'$
- Also implemented Transmission using an USB interface.
- Implemented Receiver code with the decode scheme : $'01' \Rightarrow' 0'$ and $'10' \Rightarrow' 1'$

2.3 Hardware Implementation

- Added better features to the receiver circuit like comparator and noise filter(to filter out static AC of 50Hz)
- The clock is getting synchronized in the Phase Locked Loop (PLL) circuit.
- Integrated the transmitter, receiver and the PLL circuit, with clock synchronization, currently working with 40kHz.

3 Testing

We tested each of the components in a sequential manner in order to ensure the integrity of each component.

- Given a sequence of 1's and 0's of frequency 40kHz, and the PLL locks successfully at 40kHz.
- Both the Transmitter and Receiver codes were debugged using Hardware breakpoints, and testing the same on the DSO.

4 Problems Faced

- Constructing the differentiator of Alexander Hogge Phase Detector circuit was difficult to think about, but later we implented with combination of NOT and AND gates.
- As the frequency increased the waveform of the receiver became more and more distorted (was occuring during Eval-1) at high frequencies. We overcame this using a comparator.
- During the implementation and testing of the code DSO was not available, and since there is no Logic Analyzer in Code Composer Studio, it was not possible to check the actual waveforms.
- When the USB is connected it sends some 29 random values, and we are finding it difficult to weed these random values out and this bug is yet to be solved.

5 Goals for the next evaluation

- Increase the data rate as high as possible.
- Make the whole circuit on a PCB and package it.
- Integrate the Software and Hardware.