CS 252 :Lab 03
160050081, 160050065, 160050039, 160050088

Design :

The basic design is that the given bitstring is encoded using CRC algorithm and is transmitted using self-developed android app which uses the smartphone's flashlight as a means of communication and emits light according to the input encoded string. In the same way, the output receiver receives the signal and decodes it using CRC algorithm again. A 6-bit CRC polynomial is taken fixed beforehand at both sender and receiver sides. The receiver checks the correctness and outputs as it is if it is correct. If not, we use 2-bit parity and CRC together to to detect and correct the crept-in errors.

Implementation:

We have implemented the communication interface and the CRC division algorithm in Android (Java). The code for the app and the algorithm are included in the same submission directory. The sender encodes the data using CRC algorithm, adds redundancy bits at the end of it and transmits it using the android app. We take the CRC polynomial to be "111101". A fixed time-interval is chosen at both the sender and the receiver sides for each bit. The transmitted bit is taken as '1' if the flashlight turns ON and '0' if not. The receiver notes down the values in the same fashion and decodes it using the CRC algorithm to check for any errors. If an error is present, we correct it using 2-bit parity and CRC.

Evaluation:

As an example, let us consider a 20 bit message string to be transmitted over from sender to the receiver. There will be 4+5=9 bits for 2-bit parity and the CRC redundancy bits are of length 5. We also send the length of the message as 5 bits. So, a maximum of 39 bits will be required to be sent from the sender side.The time-interval for the transmission of each bit is fixed as 0.5 second. And also, pre-adjustment and post-adjustment time can be taken as approximately around 10 secs. So, a total time of (39*0.5 + 10) = 29.5 seconds for transmission and receiving. At last, the total throughput is calculated as the division of the total amount of data sent by the total time taken; which is 39/29.5 = 1.322 bits/sec approx.