REOI for EDL Project (VLC JJ 6)

Motivation:
The idea of leveraging visible light not only for illumination but also for data transmission without any additional infrastructure is fascinating. The project topic aligns with the team's interests and supported background knowledge.

Understanding of problem statement:
The idea of VLC is based on modulation of the intensity of light (For example using on-off key- ing (OOK) or pulse-position modulation (PPM)). This involves the flickering of light which represents the bitstream. Thus, the speed of transmission is limited by flickering. Hence, high-speed LEDs are being used in VLC systems. LED bulbs are semiconductors, giving them the ability to handle ultra-fast modulation of light occurring at speeds undetectable by the human eye. RF spectrum is already over utilised and with the increasing demand for higher speed communication VLC offers alternatives for short-range communication.

Concerns:
1) Handling of non-LOS communication (if there is obstruction due to objects in the room etc, how do we ensure the reliability of transmission). Can we rely on the intensity of reflected light as well (and to what extent)?
2) Establishing secure connection
3) Managing end to end bidirectional communication

Ideas/ Plan:
We can implement DBIR (direct beam IR) first, and if it works well, attempt to implement quasi-DIR [in response to concern 1]
Broadly the system will consist of a Modulator -> Driver Circuit -> Signal Conditioning Circuit -> Demodulator
Since the bitrates required are relatively low, we can use LED transmitters instead of laser diodes (eg. RCLEDs available commercially).

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