VLC SYSTEM FOR INDOOR POSITIONING SYSTEM

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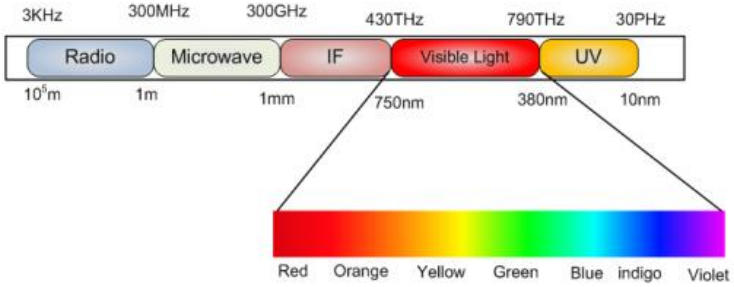
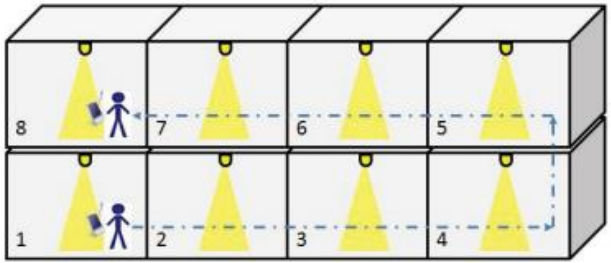
What is VLC?

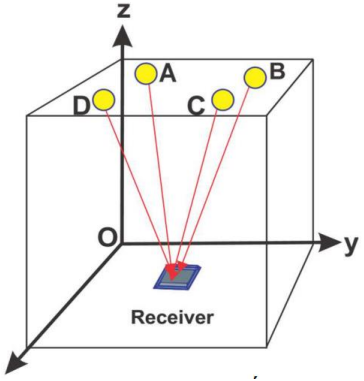




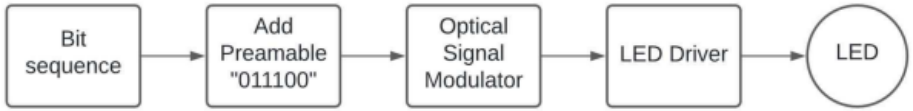
Each LED has a unique ID (x, y, z) (x, y, z < 3) is encoded into a binary 6 bits string aabbcc.

Ex: (1, 3, 2) becomes 011110

aabbcc is called Add Preamble.



II. TX SYSTEM



Tx modulation diagram

Using Manchester modulation method to encode bit sequence (8 bits ID)

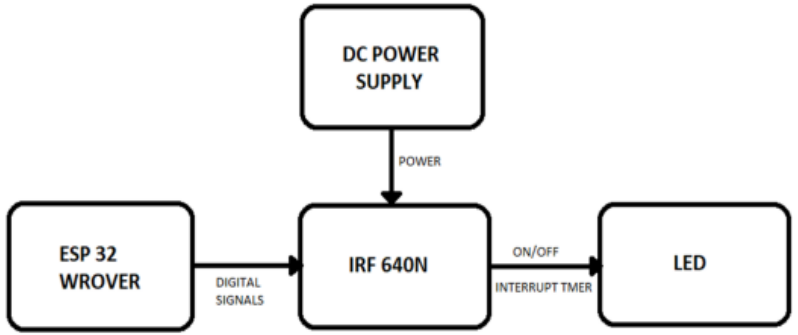
Using (On-Off Keying) OOK method to modulation signal

6 bits preamble	4 (8) bits ID

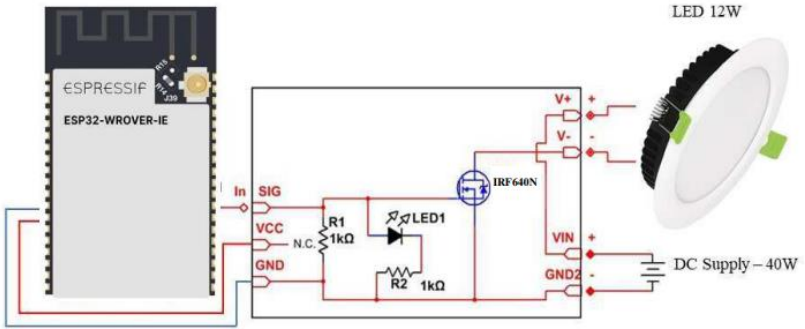
The block structure of the transmitted data packet.

(On-Off Keying) OOK modulation method

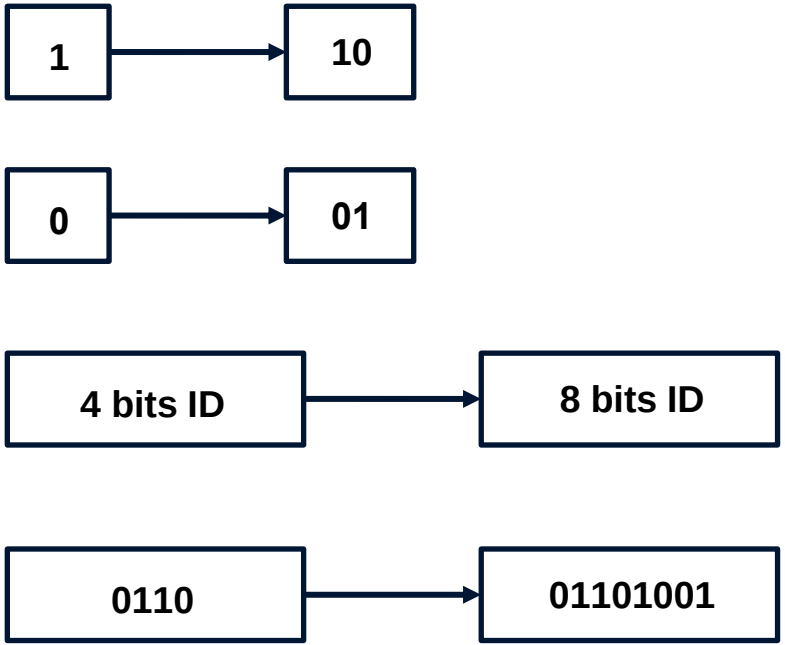
LED on	1
LED off	0

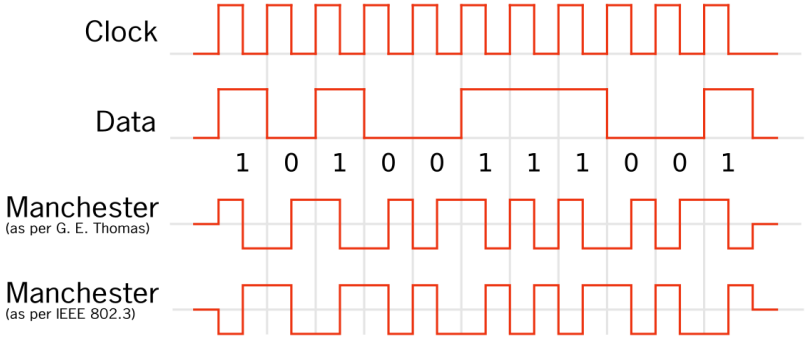


Tx block diagram



What is Manchester encoded?



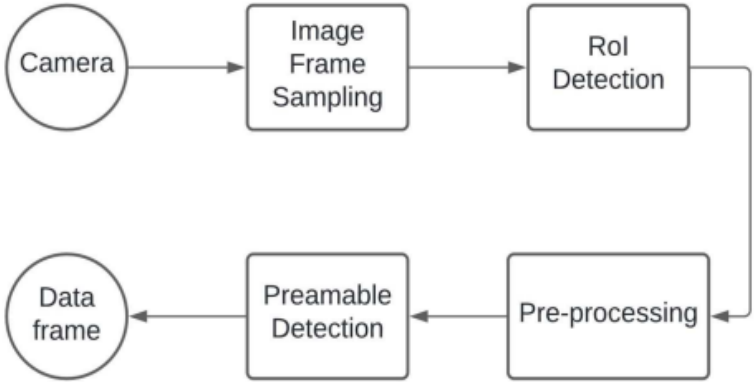


When using the OOK modulation method, it causes the LED to flicker

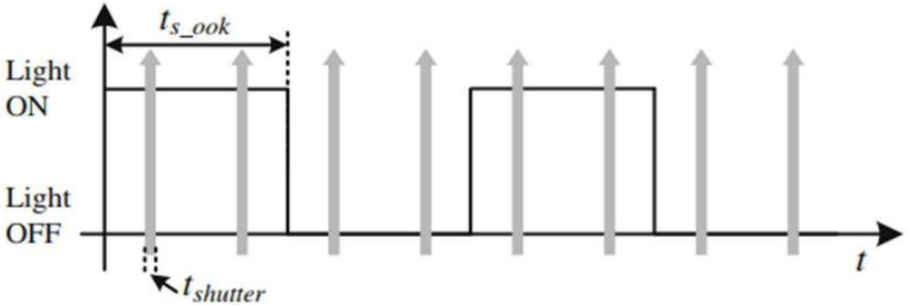
OOK only change the intensity of the initial light so that the receiver can still recognize it but human eyes cannot be.

Camera On-Off-Keying (C-OOK)

Base on on-off state of an light LED and the rolling shutter mechanism in image sensor.



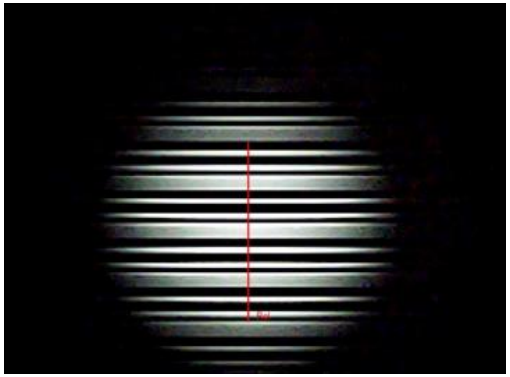
III. RX SYSTEM



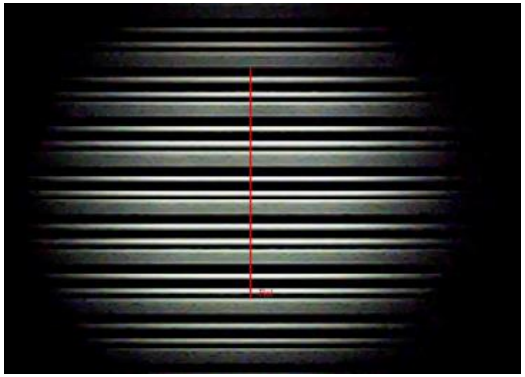
The signal frequency must be higher than 100Hz

The frame rate (sampling rate) must be at least twice the frequency from TX

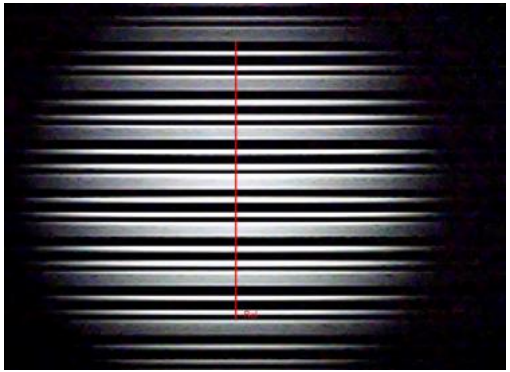
IV. RESULT AND CONCLUSION



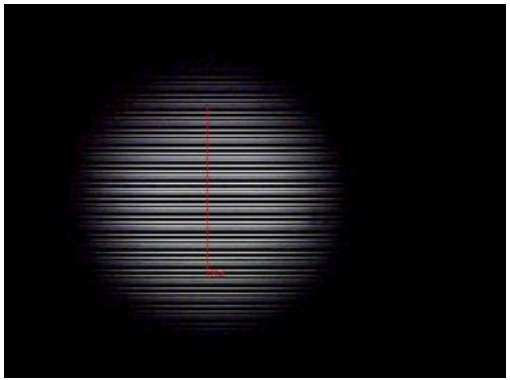
Case 1



Case 2

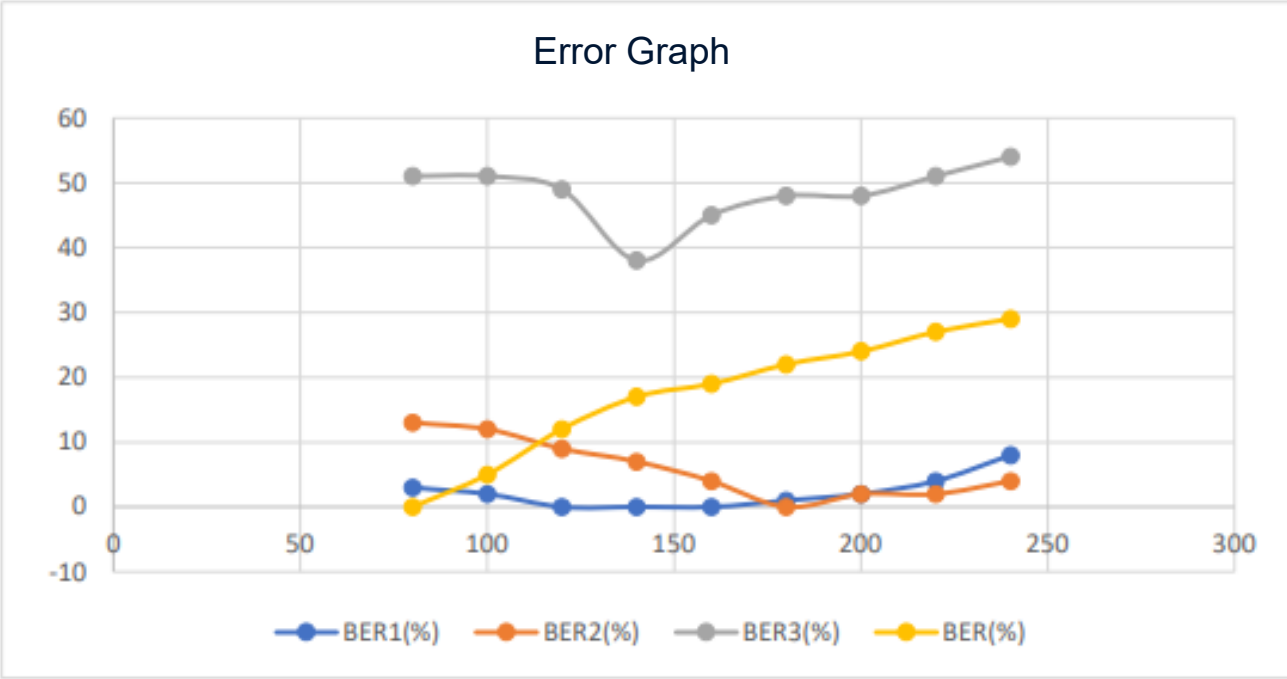


Case 3



Case 4

IV. RESULT AND CONCLUSION



FUTURE WORKS:

- **Develop an app on Android or iOS to detect signals transmitted from the Tx.**
- **Develop a Tx transmitter with a more advanced microcontroller, flashing LEDs with different frequencies for each LED.**
- **Develop a system to accurately locate the receiver's position.**

REFERENCE

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4. Yang Liu, Chi-Wai Chow, Kevin Liang, Hung-Yu Chen, Chin-Wei Hsu, Chung-Yen Chen, and Shih-Hao Chen, "Comparison of thresholding schemes for visible light," *Optics Express,* 2016.

THANK YOU FOR LISTENING