

# Experimental characterization of a new Software Defined Radio-based DSP stage for VLC systems

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# Introduction

- RF technology is facing congestion.
- Optical wireless communication(OWC) has already proved itself as a potential candidate for next generation communication.
- OWC is just a step behind of the real time deployment.
- Potential applications: indoor/outdoor communication, intelligent transport system, underwater communication, intersatellite communication etc.

# Motivation

- Before full deployment of VLC system, more sensitive and compliant receiver design is needed.
- Receiver should be able to do:
  - I. Filter out ambient light
  - II. Relax misalignment issues
  - III. Low cost
  - IV. Robust
- Majorly, noise is produced by various factors:
  - I. Artificial light sources
  - II. Natural light sources: sun, stars and other objects

# System architecture

- Comparison of three system under consideration are given in fig 1.
- Fig 1a represents transmitter side NRZ OOK Manchester encoded packets are produced by Arduino Due.
- Fig 1b represents receiver side with integrated software defined radio.
- Fig 1(c,d,e) represents direct Arduino, bridge and Full system.

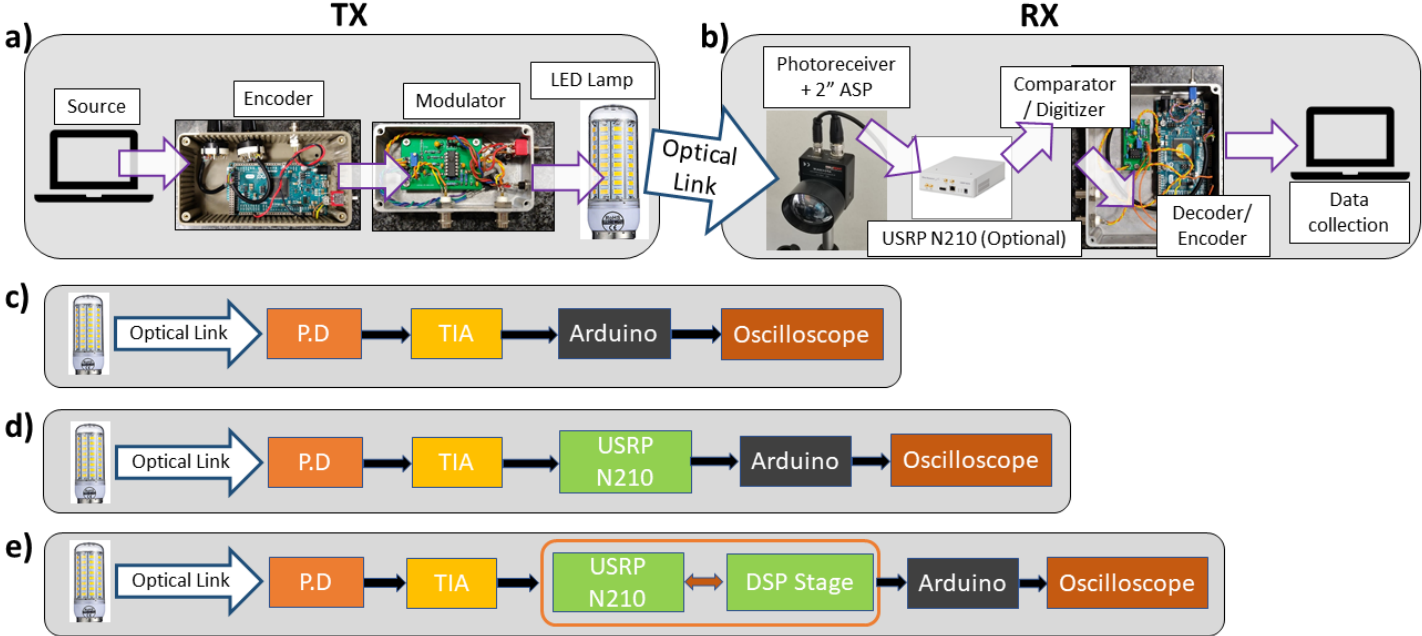


Figure: 1

# SDR based filtering stage

- DC block is used to filter out any DC offset.
- AGC maintain the level of received signal in a certain limit.
- Low pass filter to filter out high frequency noise.
- Input bandwidth shown for different DC block length (fig: 3).

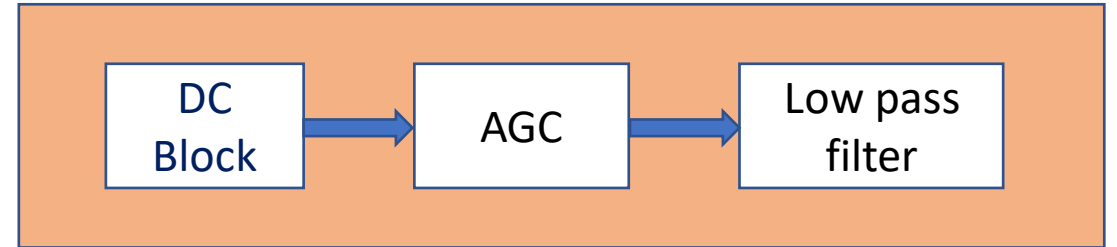


Figure: 2

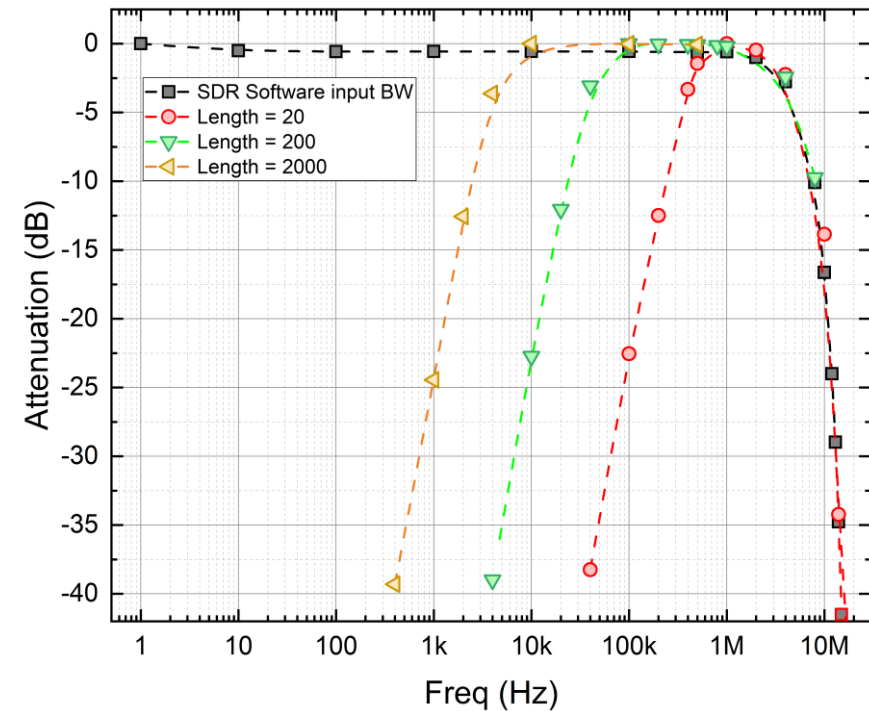


Figure:3

# Results and Discussion

- In fig 3 Optical Signal (OS) amplitude vs Packet-Error-Rate (PER) is shown.
- Filled data points show PER depending on received OS.
- Solid lines are representing best fit considering relation between PER and SNR.
- With designed filtering stage the performance of the system is increases by 10 folds.

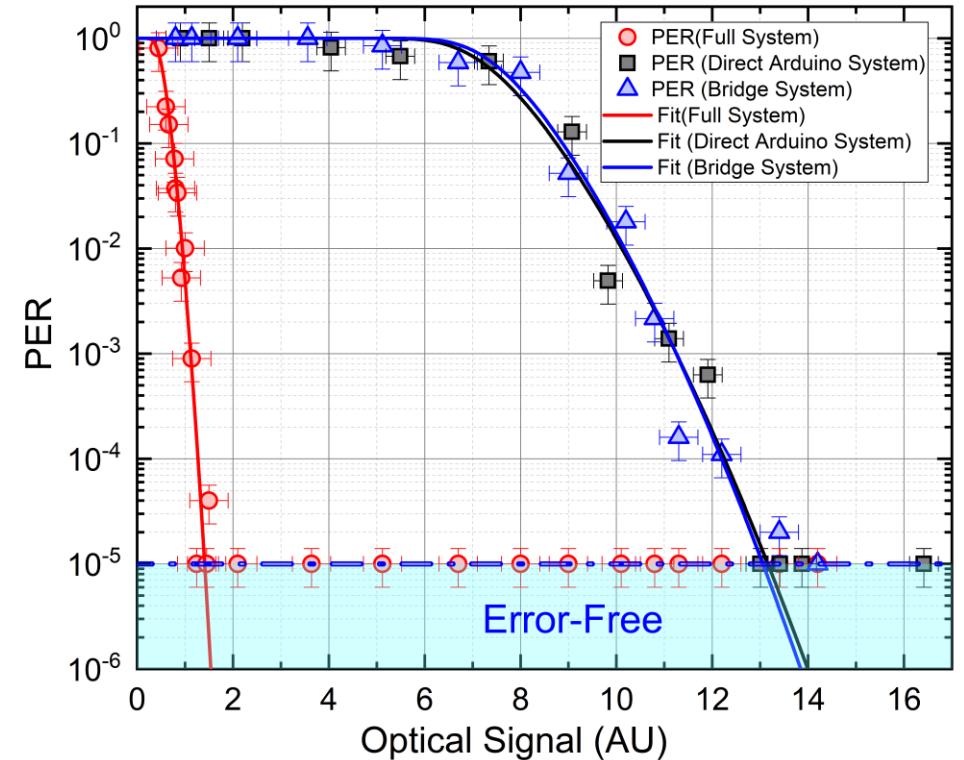


Figure:4

	Direct Arduino	Bridge	Full
<b>PER = <math>10^{-5}</math></b>	OS = 13.2	OS = 13.2	OS = 1.4
<b>PER = <math>10^{-3}</math></b>	OS = 11.3	OS = 11.3	OS = 1.1

Figure:5

**Thank you**

**Any Questions**