Masterthesis

» Implementation of an Automotive Visible Light Sensing System «

The research group
**Circuit and System Technology**
offers a
Masterthesis

Due to the rapidly increasing number of radio-based systems such as 4G, 5G, 6G, Bluetooth, WLAN, etc., the radio bands are already heavily utilized and strictly regulated. On the other hand, there is the several THz wide, license-free, visible part of the electromagnetic spectrum. Visible light sensing uses this band for distance measurement. White LEDs are used as transmitters for this purpose. The LEDs not only illuminate a room, but their fast switching speed also allows ambient information to be measured. [1]
In this work, a transportable sensor node with visible light is to be developed, which is able to measure distances of up to 50m.
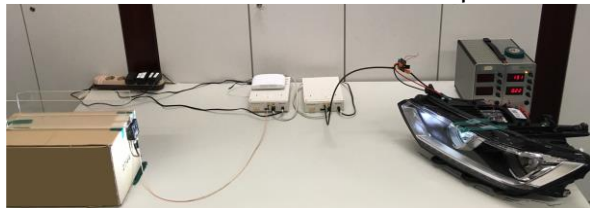
Mesurement setup of a visible light system [2].

[1] S. Kruse et al., "Design of an Automotive Visible Light Communications Link using an Off-The-Shelf LED Headlight," ANALOG 2018; 16th GMM/ITG-Symposium, 2018, pp. 1-5.

[2] J. Koepe et al., "Poster: First Performance Insights on Our Novel OFDM-based Vehicular VLC Prototype," 2018 IEEE Vehicular Networking Conference (VNC), 2018, pp. 1-2

Task Description:

In this thesis, a transportable sensor node is to be set up using an LED car headlight. Distances of up to 50m are to be measured using this. The work content includes:

- Literature research
- Link budget analysis
- Design and implementation of the frontend hardware including. This includes, among other things:TCA, TIA, PLL, and interface to a graphical display
- Programming of the graphical display
- Testing

Requirements:
- Solid knowledge of circuit and system design.
- Experience with simulation environments such as LtSpice, PSpice, ADS or similar.
- Experience with KiCad or another PCB tool.
- Experience with Matlab is desirable but not required.
- Programming experience in Python and/or C++ is desirable but not required.

In case of interest, please send an E-Mail containing your latest transcript of records to Stephan Kruse (stkruse@hni.upb.de)

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