

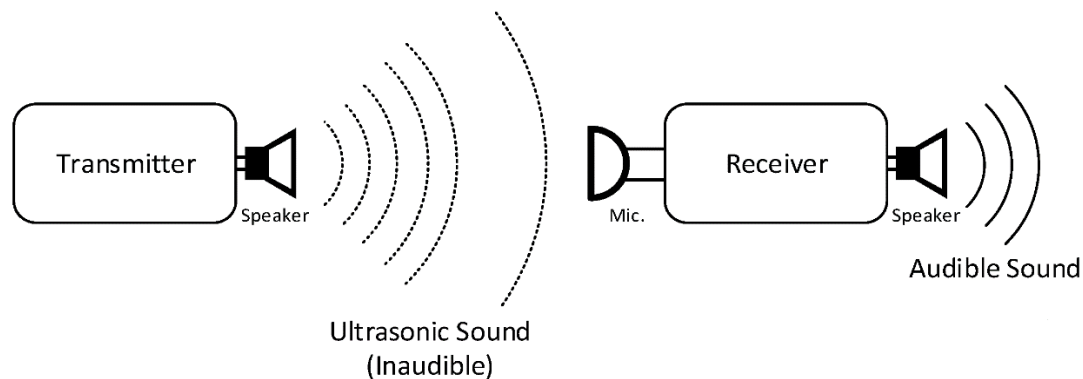


Ultrasonic Communication Systems

Forschungspraxis Position at the Chair of Circuit Design

Introduction:

Ultrasonic signals are widely used in the field of medical imaging and industrial nondestructive testing. Ultrasonic wave can propagate through solid, liquid or gas media and consequently can be used as the carrier of the information for communications. Usually, an ultrasonic data communication system includes transmitter and receiver as depicted in this figure.



Timeline:

The research internship for a master student can be done full-time (9 weeks) or part-time (20 weeks). If the student's work is good enough, this topic can be offered as a master thesis.

What you will do

Start from reading some state-of-art literature papers on the topic. The following questions are expected in your work:

- Motivation: Why we need to transmit/receive data by ultrasonic? Compare it with the conventional wire or RF data communication.
- Specifications: What are the specifications for an ultrasonic data communication?
- Design: What is the structure and circuit for an ultrasonic sound transmitter/receiver? What are the advantages/disadvantages in the state-of-the-art works?

Then, model the ultrasonic communication system in LTspice. Choose right electrical components and design a PCB-level ultrasonic communication system.

Requirements:

- BSEI(IP)/MSEI (FP) study focus on design of electronic circuits and systems.
- Some background in analog and mixed-mode circuit design is preferred.
- Some knowledge of LTspice or Cadence Simulation Tools is preferred.
- Some experience in digital Verilog/VHDL language is preferred.

Interested?

→ contact:

Dr. Pengcheng Xu
Email: pengcheng.xu@tum.de
Office: N5306