Xin Xie

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Education

University of Chinese Academy of Sciences & ShanghaiTech University Shanghai, China, 09/2014 – 07/2017

M.S. in Communication and Information System *Advisor: Prof. Xiliang Luo*

Tongji University Shanghai, China, 09/2010 – 07/2014

B.S. in Communication Engineering *Advisor: Prof. Aihuang Guo*

Research Direction

Visible light communication (VLC) system, TDD channel antenna calibration in massive MIMO.

Publications

Conference Papers

1. **X. Xie**, and X. Luo, "Hierarchical visible light communication system", in *Proc. IEEE ICUWB*, Nanjing, China, Oct. 2016.
2. **X. Xie**, Y. Xu, Q. Ling, X. Wang, and X. Luo, "Frugal calibration of mutual coupling in large scale antenna array," in *Proc. IEEE IWCMC*, Valencia, Spain, Jun. 2017.
3. X. Luo, S. Yao, **X. Xie**, Y. Xu, and X. Wang, "Compressive massive MIMO calibration," in *Proc. IEEE ICUWB*, Nanjing, China, Oct. 2016.

Research Experience

ShanghaiTech University Shanghai, China, 09/2014 - 07/2017
Data-Information Analysis Lab (DIAL)

✏ **Hierarchical Visible Light Communication System:** Visible light communication (VLC) has attached a lot of interests due to its safety, practicability, and effciency. In a VLC system with multiple light-emitting-diodes (LEDs), two different types of channels named imaging channel and non-imaging channel can be used to transmit data. In this work, basing on the channel characteristics, we propose a novel hierarchical VLC system which supports two different types of receivers simultaneously. Meanwhile, we also demonstrate how to achieve maximum throughput with optimal power allocation. Numerical results are also provided to corroborate our designs. The work has been published in *IEEE ICUWB*.

✏ **Antenna Calibration in Massive MIMO:** In the massive MIMO era, there are hundreds of antenna elements at one single base station (BS). It becomes critical to take full advantage of time-division duplexing (TDD) channel reciprocity to learn the downlink (DL) channel state information (CSI) from the uplink (UL) channel measurements at the BS. However, due to different radio frequency branches for transmitting and receiving, antenna calibration at the BS is necessary to effect this reciprocity between the end-to-end DL and UL channels. In massive MIMO, this procedure becomes extremely challenging since all the existing antenna calibration approaches do not scale well with the size of the antenna array. In our work, we rely on the compressive sensing (CS) theory to develop an efficient and robust way to calibrate the massive antenna array at the BS, which only requires CSI feedbacks in the order of log N instead of N as in those conventional calibration schemes. Extensive simulations demonstrate our approach can maintain the whole large scale antenna system in a "calibrated" state with only a small amount of feedback overhead. The work has been published in *IEEE ICUWB*. Besides the RF gains mismatch, as the antenna elements are placed close to each other, the mutual coupling effects among the adjacent antennas also become pronounced. Different coupling matrices for transmission and reception also hurt the end-to-end UL/DL channel reciprocity. Aiming to restore the end-to-end channel reci-procity with a small

amount of over-the-air (OTA) resources, we propose to estimate the gain mismatches of the RF electronics and the mutual coupling mismatches separately. Specifically, we rely on the pilot exchanges among the BS antennas and the symmetry of the antenna array to recover the transmitting and receiving gains of all the RF components. Unlike prior calibration works, our schemes can recover the off-diagonal elements in the calibration matrix as well. This work has been published in *IEEE IWCMC*.

Work Experience

XinYi Information Technology (Start-up) Shanghai, China, 07/2017 - now
Baseband Algorithm Engineer

✏ **NB-IoT SoC chip:** Our product is a Narrow-Band Internet of Things (NB-IoT) SoC chip. I focus on the demodulation and decode of physical layer downlink channels, including algorithm design with MATLAB and implementation with DSP. Related algorithms include space frequency block code (SFBC) demodulation and tail-biting convolutional code (TBCC) decoding, etc. There are only three engineers and one project leader in this group, where I serve as the first joined engineer and participate in the whole procedure. Besides, I am also familiar with the overall flow of baseband, and the basic function of other baseband blocks, such as cell search, channel estimation, frequency/tracking loop, etc. My work is mainly based on 3GPP protocols such as technical specifications 36.211, 36.212, 36.213, 36.331, and 36.521.

Awards

Third-class Scholarship 09/2011 – 07/2012

@ Tongji University

Skills

Proficient in Matlab, Simulink, C, LaTex, and MS office

Last updated: June 25, 2019