

FACTULY MENTOR

Zhang, Xinyu

PROJECT TITLE

An Android App for Indoor Navigation

PROJECT DESCRIPTION

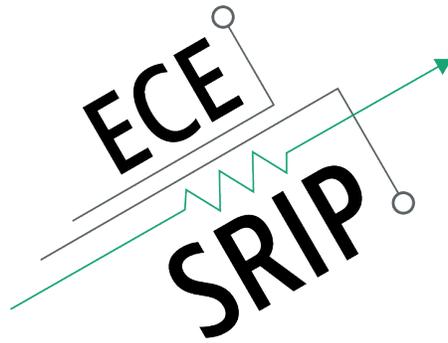
Indoor localization technology holds potential to revolutionize human activities indoor, just as GPS did for outdoor navigation. Despite numerous technologies proposed to sense indoor location, none of them have been widely deployed due to cost and reliability issues. In this project, we will develop an Android mobile app that can identify a smartphone's location using ceiling lights as location landmarks. We will repurpose the smartphone camera as location sensor, and develop efficient machine learning algorithms to extrapolate location information from the camera image. As a first step, this app will be used for buildings in UC San Diego, such as libraries and lecture halls.

INTERNS NEEDED

2 BS, 2 MS

PREREQUISITES

Java or C++ programming



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PROJECT TITLE

Sensing heart rate using WiFi

PROJECT DESCRIPTION

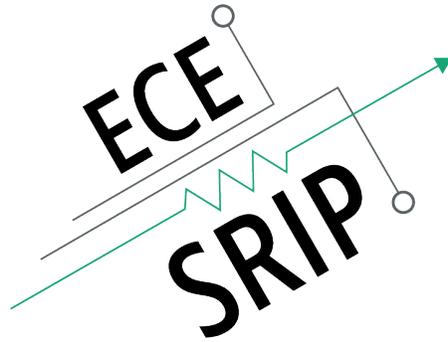
Non-intrusive heart-rate monitoring can enable a wide range of health-related applications, such as elderly care and in-home patient assessment. Existing approaches mostly use on-body sensors, which can be cumbersome and raise compliance issues. In this project, we will design a system that uses WiFi-like radio devices to remotely track the users' heart-rate. We will use a mix of signal processing algorithms and machine learning models to enable reliable and accurate heart-rate sensing, even in a dynamic environment with random human activities.

INTERNS NEEDED

2 BS, 1 MS

PREREQUISITES

Digital signal processing; Matlab programming



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PROJECT TITLE

Enabling 5G Mobile Wireless Networks At Scale

PROJECT DESCRIPTION

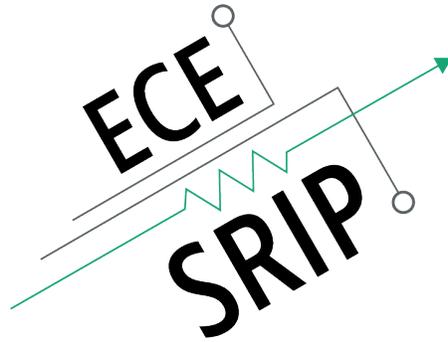
5G wireless networks are expected to use highly directional "laser-like" beams to deliver signals, thus boosting the signal quality and network capacity. Such directional signals, often running on the millimeter-wave band, are vulnerable to human blockage and become unreliable when the radios are moving. In this project, we will design efficient network management solutions that can realize seamless coverage and mobility support for 5G networks. The solutions will be implemented on a millimeter-wave testbed that we will deploy on campus.

INTERNS NEEDED

3 BS, 2 MS

PREREQUISITES

C++ programming



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PROJECT TITLE

A Hardware Platform to Support 5G Communications and Wireless Sensing Applications

PROJECT DESCRIPTION

The first four generations of wireless networks mainly run on the low-frequency microwave band. For 5G and beyond, millimeter-wave will become the dominant communication medium. The availability of mobile millimeter-wave devices will also enable novel wireless sensing applications, such as the Google Project Soli. In this project, we will design and implement a hardware platform to enable exploration of such new communication and sensing paradigms. The platform will assemble existing RF chips and FPGA baseband processors into a programmable radio.

INTERNS NEEDED

3 BS, 2 MS

PREREQUISITES

Circuits design