

Real Time Fitness Assistant via WiFi

Advisor: Prof. Yingying Chen

**Justin Esposito, Sachin Mathew, Amit Patel,
Rishika Sakhuja, Kushaan Misra**

About Us

Amit



Electrical
Engineering

RUTGERS

Class of 2022

Sachin



Electrical
Engineering
and Computer
Science

RUTGERS

Class of 2022

Justin



Electrical
Engineering
and Computer
Science

RUTGERS

Class of 2022

Rishika



Electrical and
Computer
Engineering

RUTGERS

Class of 2023

Kushaan



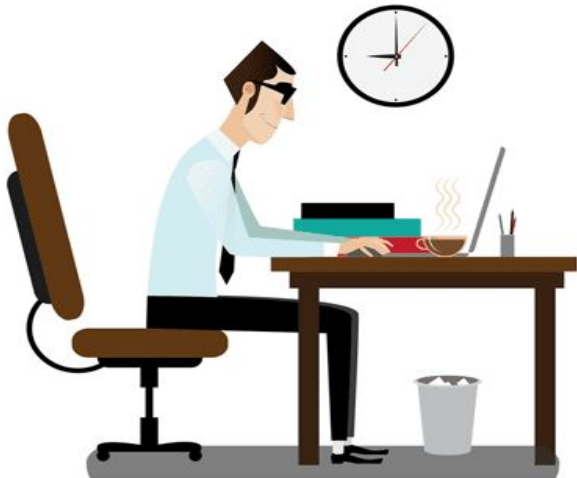
High School
Student

**SINGAPORE
AMERICAN SCHOOL**

Class of 2020

Motivation

- People are more sedentary
- People cannot obtain cheap fitness assistance at home

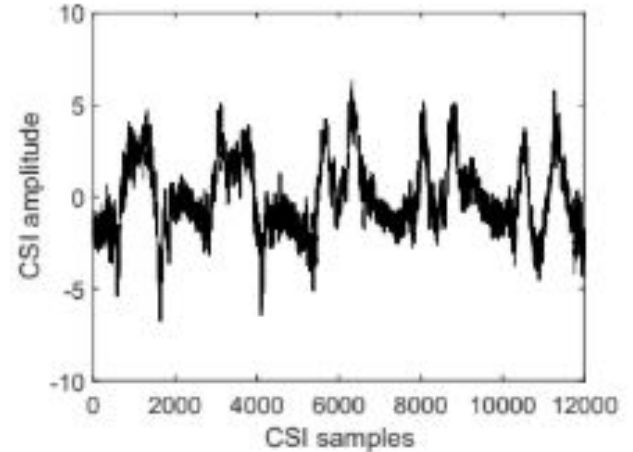


Real World Analogy



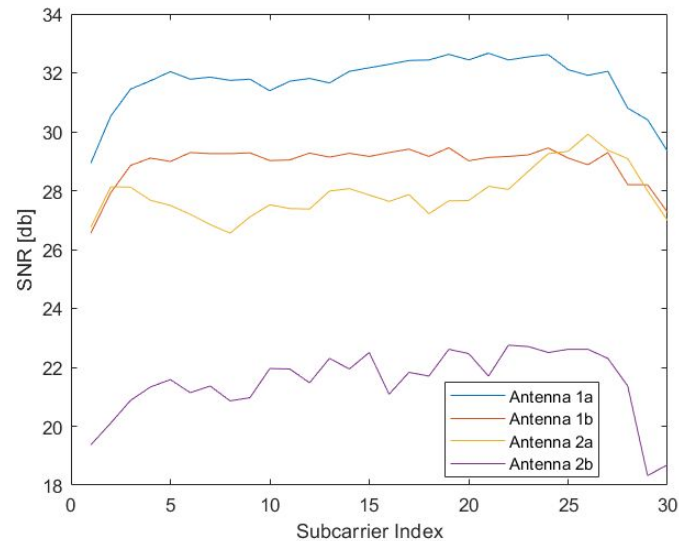
Idea

- Develop a real-time fitness assistant that works over existing infrastructure in a home/office
- Measure WiFi signals over time to capture human motion



Channel State Information

- CSI describes how a signal moves through a medium
- Using tool that measures CSI readings of 30 subcarrier groups (56 subcarriers)



Set-Up



Client

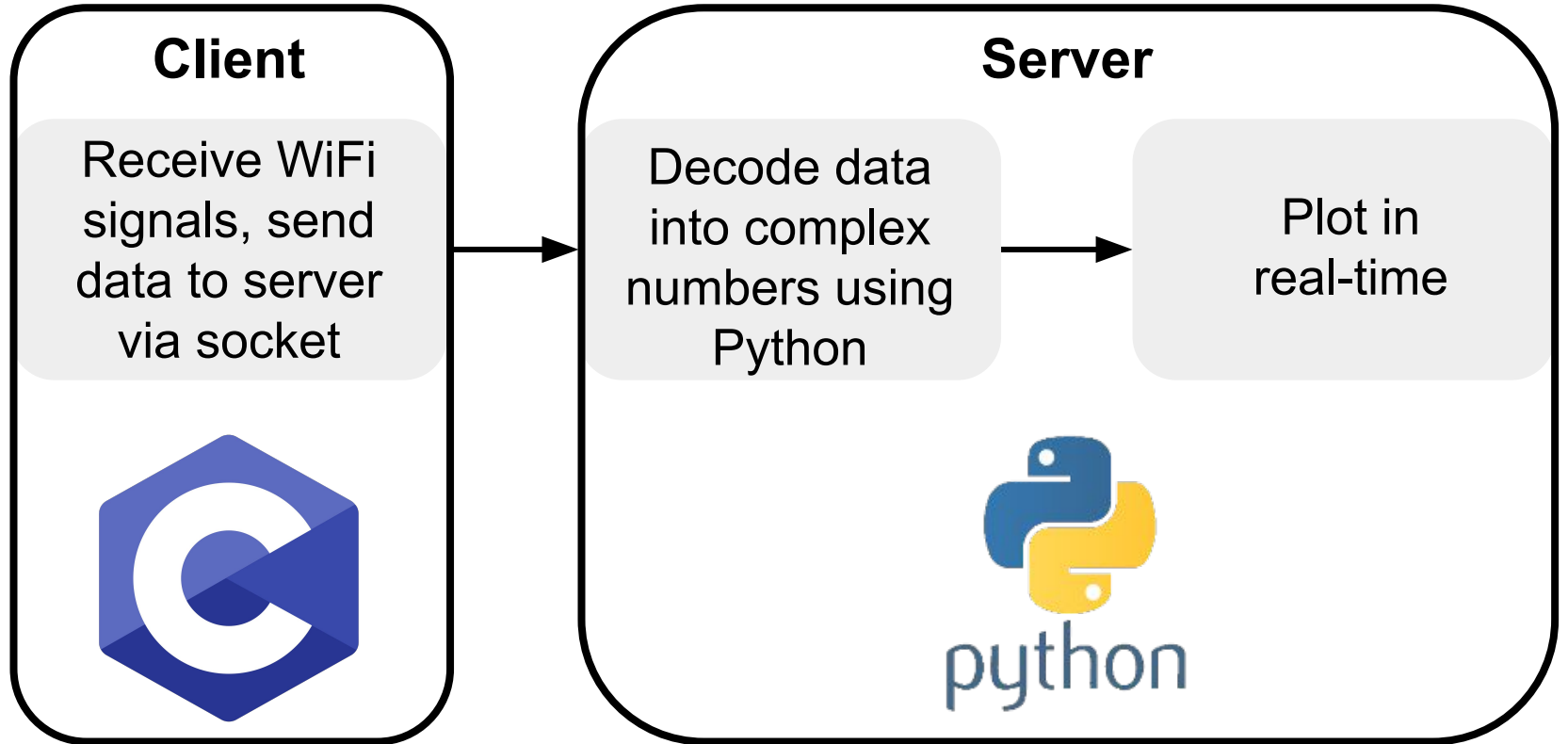


Ethernet

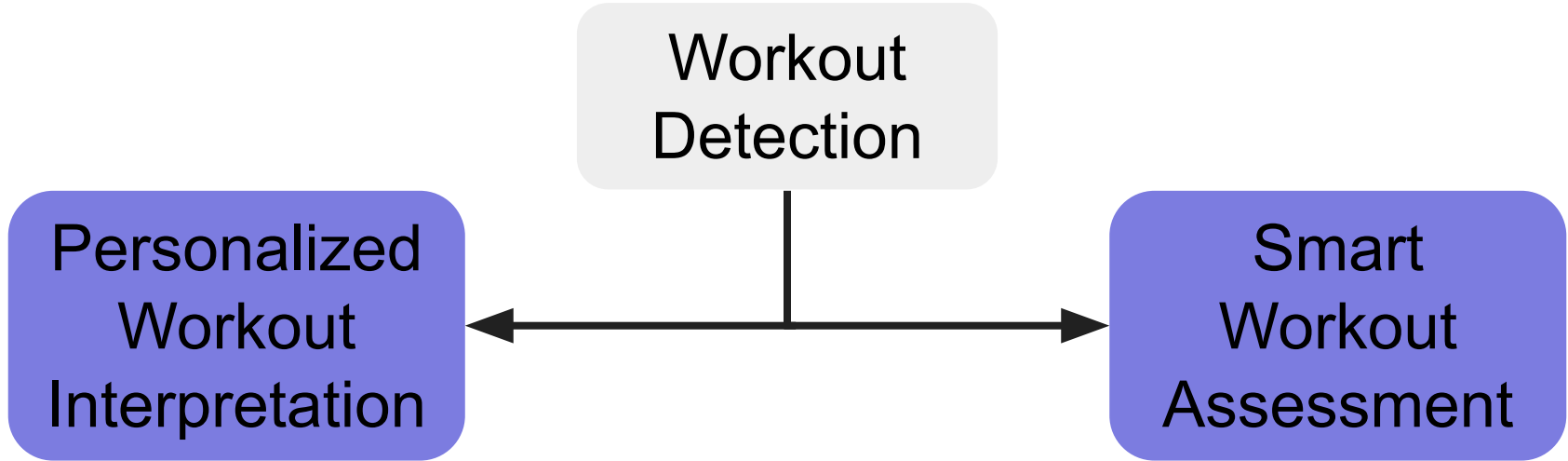


Server

Real-Time CSI

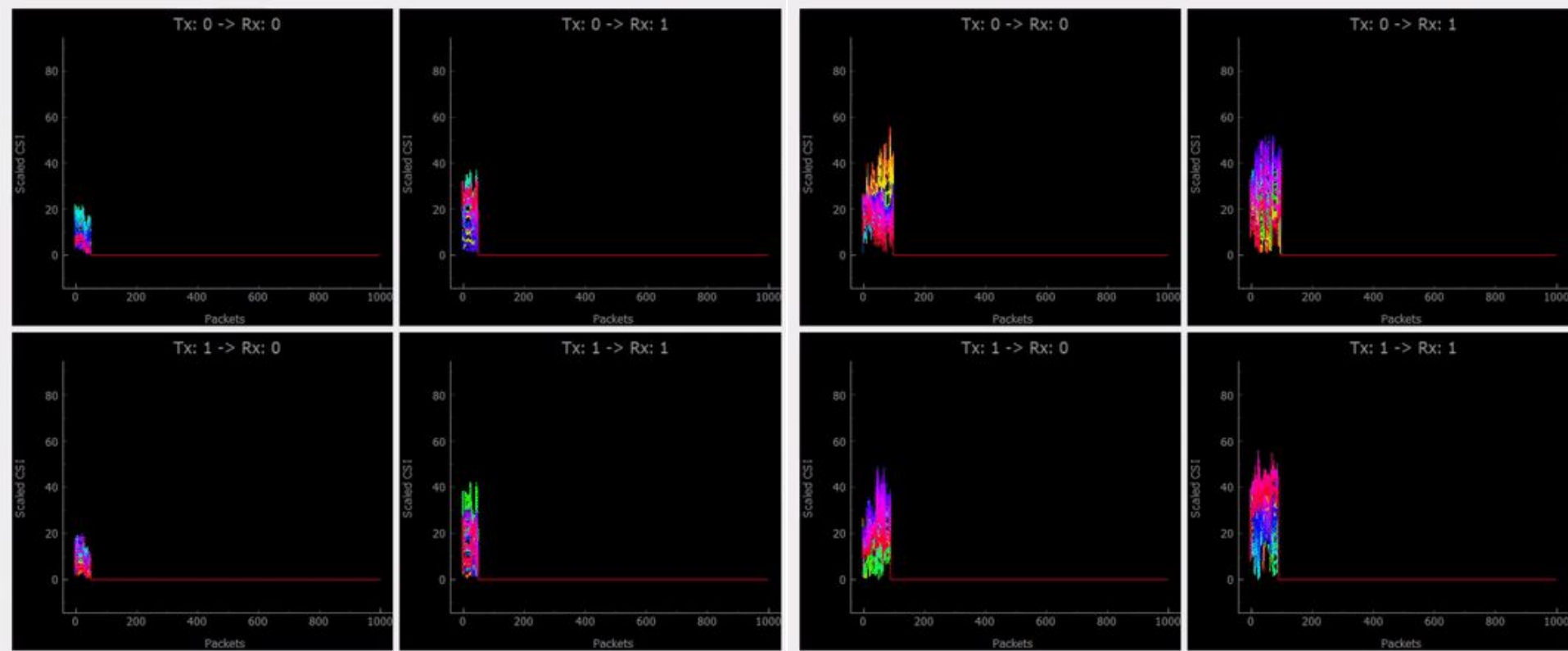


Analyze Workouts



Machine Learning

- Data is too abstract, separate the exercises into smaller reps and look for key features
 - Minimum, maximum, average, etc.
- Plug key features into machine learning algorithm (Deep Neural Network) to learn to associate certain features with certain exercises



No Movement

Push-ups in Office