Miami University ECE 448/9 Senior Design Project Report

Power Measurement of a Computing System (Fall 2021/Spring 2022)

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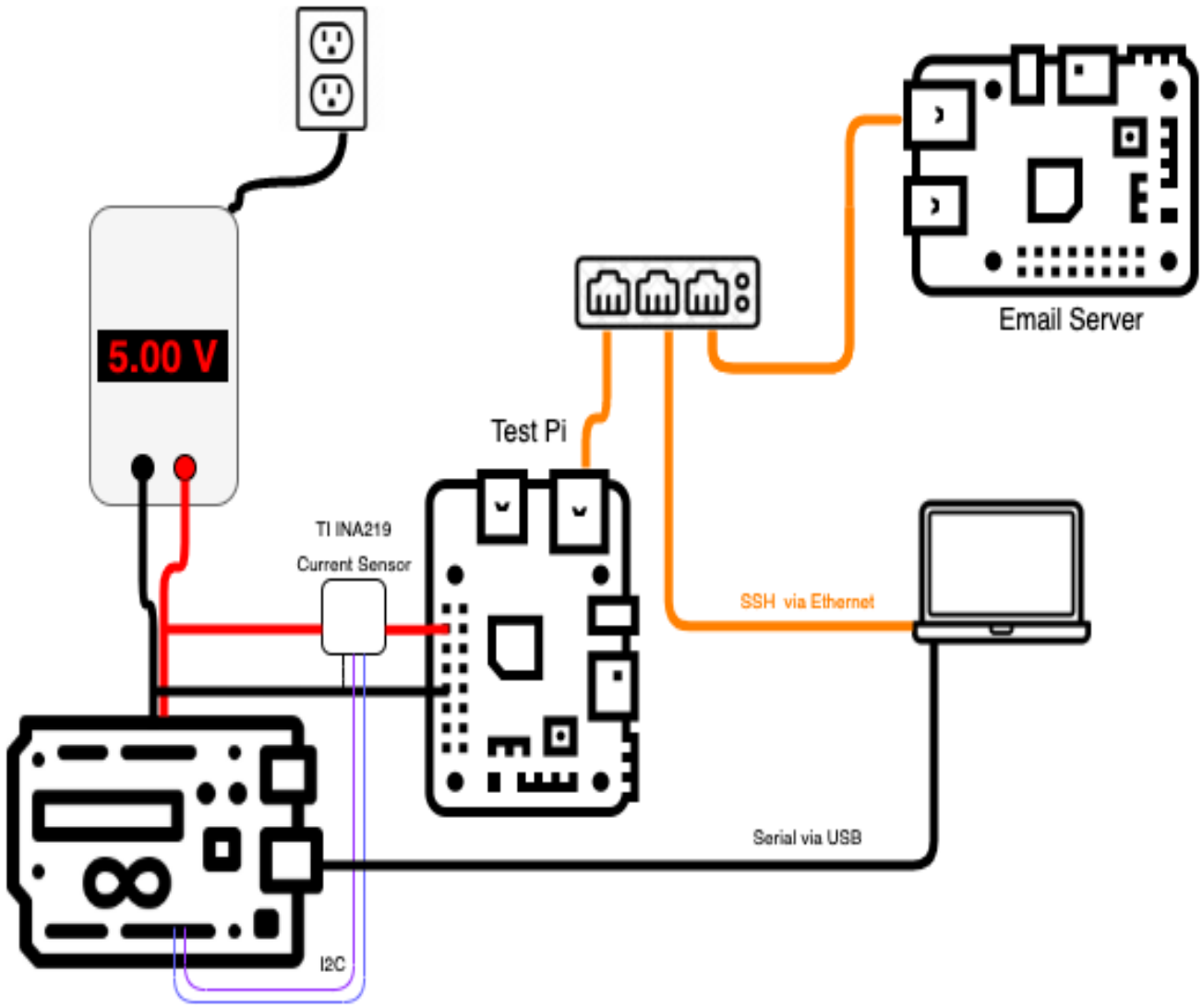
Abstract

The original goal of this project was to create a power measurement system that could log the power consumption of various perophirals plugged into a power strip. This would give an idea of how much power each piece of equipment was using at any given time.

Before work on the project began, we changed the overall scope of the project to determine the power consumption on a Raspberry Pi for various Python and Objective-C scripts. These scripts will call several different functions including sending email messages, writing to files, accessing webpages, and performing basic arithmetic operations.

Project Background & Research

Solution Implementation



(not the what, more the data)

Data Findings & Interpretation

- Python Addition/Subtraction/Multiply/Divide print
- Python Addition/Subtraction/Multiply/Divide no print
- Python Write to file
- Objective-C Write to file
- Python LAN ping print
- Python LAN ping no print

  Our Python multiplication program multiplied by a constant of two. This means that it was equivalent to a left shift, and the Python interpreter likely simplified this event, which is why the power consumption recorded was so low.

Operation	Average Increase in Power (w)	Power Usage / Computing Event (W/s)
Python LAN Ping & Print	0.25	0.00286
Python LAN Ping No Print	0.19	0.001967564
Python Addition & Print	0.904	3.47814E-05
Python Subtraction & Print	0.896	2.00675E-06
Python Multiplication by Constant 2 & Print	0.145	0.000472495
Python Division & Print	0.189	0.000765223
Python Addition No Print	0.447	1.15415E-06
Python Subtraction No Print	0.643	1.05705E-06
Python Multiplication by Constant 2 No Print	0.195	0.00048287
Python Division No Print	0.124	0.000278534
Python Write To File	0.42	0.1.1844E-06
Objective-C Write to File	0.414	7.27639E-08

Future Project Goals

Conclusion