<u>Web-Controlled Distributed Wireless Power Control</u>

ECE 445 Project Proposal
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Team 10:

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I. Introduction

1. Title

Web-Controlled Wireless Distributed Power Control

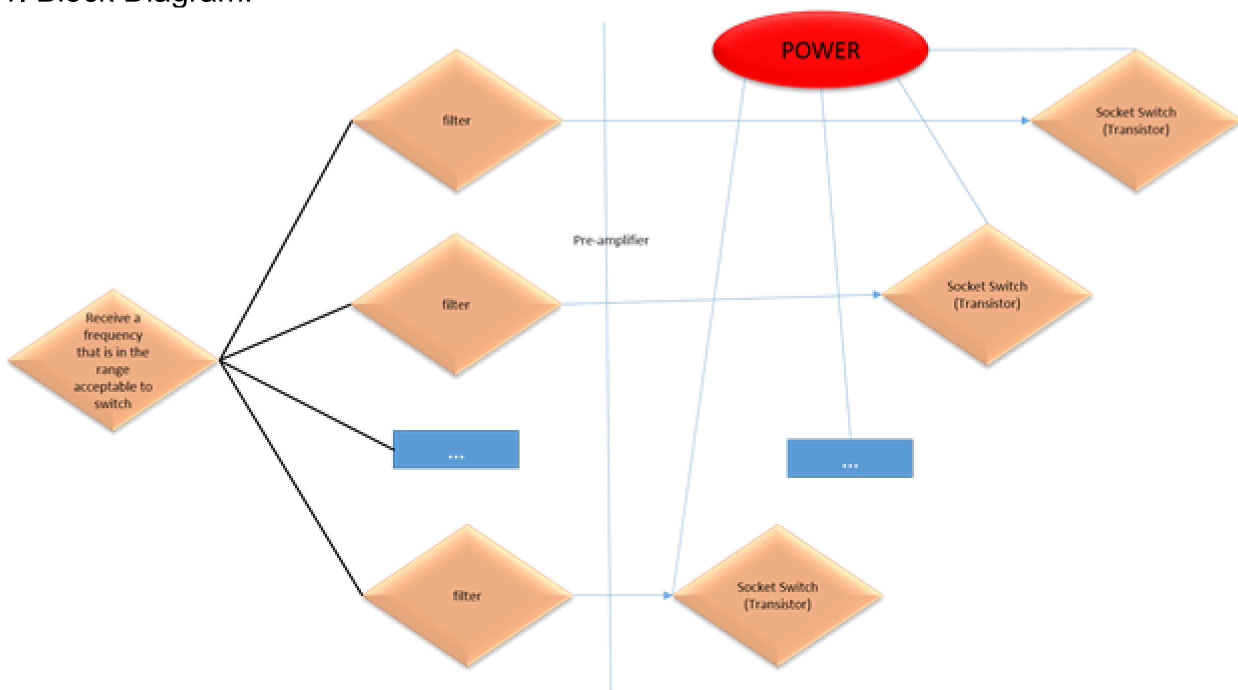
We selected this project because it involves a great deal of concepts we have studied throughout our ECE careers. We formed our group before enrolling in the class and decided to take on the challenge of senior design because we had the idea of implementing system. We are very excited in creating this design because the concept will not only build on our knowledge about RF, Power, and Web/App development, but the idea can prove to fill a niche market as a consumer product.

2. Objectives
    - **i.** To implement a power strip
    - **ii.** To implement wireless controls for the power strip
    - **iii.** To implement web user interface to the wireless controls

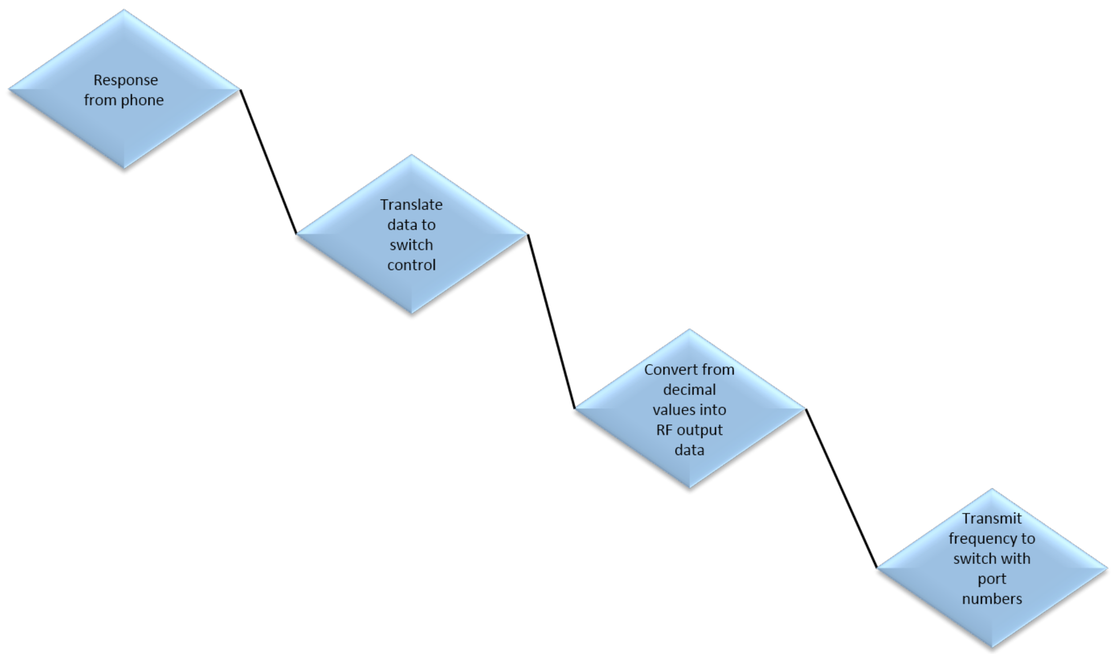
Benefits
    - i. Individual control over every socket in the power strip
    - ii. Design that can be made for under $50 and sold at an affordable price
    - iii. Easy to use web interface broadcasted on home network

II. Design

1. Block Diagram:



Power: The power block is the source from the wall.
Filter: The filter is going to be a system that we will design which is going to a reactive network meant to only pass in frequencies.
Socket: The sockets correspond to the sockets on the switch, The filtering process will tell which switch to be on when.



Microprocessor:

Response from phone: The phone in this case (which in reality can be any pre-approved system webserver possibly) is the means by which we are relaying the output we want from our switch control.
Translate data: The data that we get as input has to be translated into a frequency and a band that can be switched.
Transmit: Transmit the data via a frequency band so it can be easily received and read.

III. Requirements and Verification

1. Requirements

Transceiver: the receiver needs to be able to recreate the signal radiated at the transmitter

Filter: the filter needs to be able to output a single specific frequency at an amplitude of 100 times higher than all other frequencies at the input

Switching Transistor: needs to be able to pass AC power from a wall jack when it is electrically excited, and needs to act like an open circuit when it is not electrically excited. It needs to be able to dissipate 90W for 10 hours at a time without a drop in performance.

2. Verification:

Reciever: A signal generator will be used to create a signal that will be inputted to the transmitter. If there is a 1-to-1 relation between the inputted signal and the signal created at the receiver output, then this block will be valid

Filter: A signal generator will be used to input a multi-frequency signal into the filter. The output of the filter will be examined through a spectrum analyzer and the contribution to the output from the desired frequency component will be compared to all other frequency contributions. If the desired frequency is 100 times larger in magnitude than any of the other contributions then the filter will be valid.

Switching Transistor: The transistor will be excited with an AC signal and must pass through power from a wall jack to a load for 10 hours straight without a loss of performance. If the transistor can still switch between very high impedance and very low impedance after the power run test, then the switching transistor will be valid.

3. Tolerance Analysis

The element of our circuit that is going to be most out of our control is the value of the capacitors in our filter block. Because capacitors are going to be the most difficult passive elements to tune, the capacitor values that we have most ready access to will determine the different carrier bandwidths that we will use, and that in turn will determine the maximum number of power sockets that can be controlled.

IV. Cost and Schedule

1. Cost Analysis:

Member	$/hour	Hours Invested	Total = Rate x Total Hours x 2.5
Ehsan Keramat	50	140	$17,500
John Kharouta	50	140	$17,500
Chaitanya Patchava	55	140	$19,250
			$54,250

Product	Quantity	Cost
Surge Protector	1	$15
RFMB Radio	6	$6
Raspberry PI	1	$35
Arduino Microcontroller	1	$30
inductors	6	$2
capacitors	6	$2

High-Power Transistors	6	$30

2. Schedule

Week	Task	Member
9/24	Order all the parts necessary Research Web UI services Research switch control	Chaitanya Patchava John Eshan
10/1	Research	Chaitanya Ehsan John
10/8	Research	Chaitan Ehsan John
10/15	Set up the transmitting system Set up receiving Begin to host web UI on host hub	Chaitan Ehsan John
10/22	Being able to test digital transmitting system Start controlling on/off sockets Have basic app templace	Chaitan
10/29	TBD	
11/5	TBD	
11/12	TBD	
11/19	Thanksgiving Break	All

11/26		
12/3	Project Demos	All
12/10	Final Project Presentations	All