Gridless Wireless Network
Functional Decomposition Diagram

Team name:
Off the Grid

Team members:
Ian Schneier
Linda Palacios
Weikang Zhang
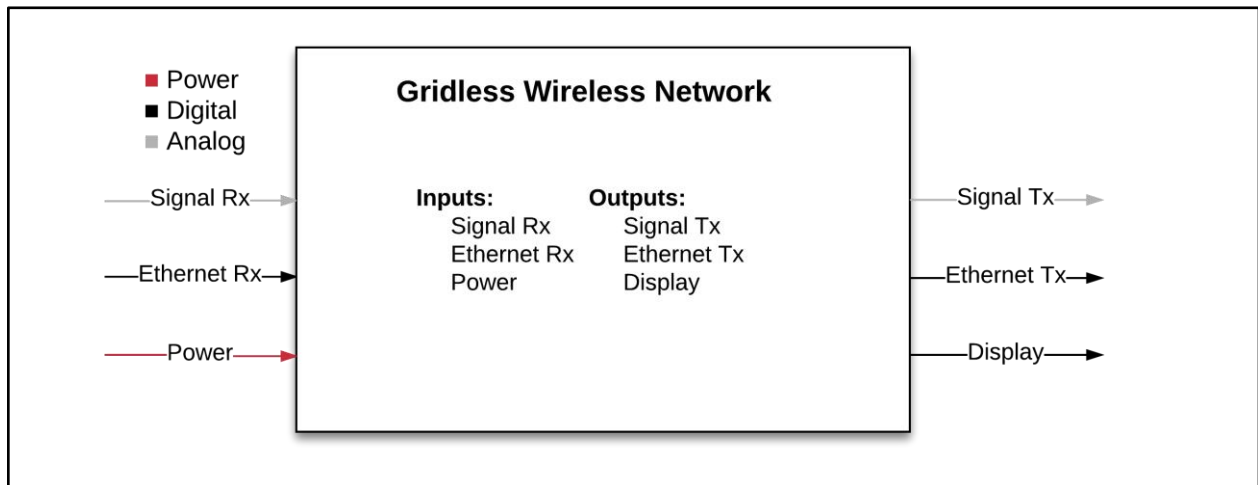Xucheng You
Jingwen Luo
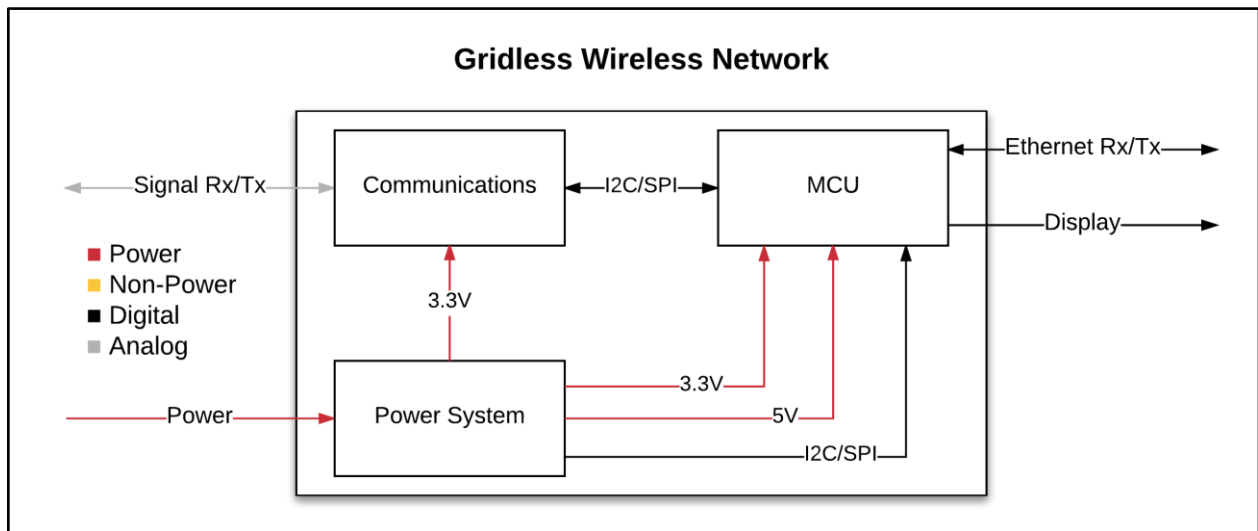Alec Motazedi

Project Sponsor:

Prof. Alan Mickelson

Level 0

| Inputs	Signal Rx, Ethernet Rx, and Power
Outputs	Signal Tx, Ethernet Tx, and Display
Description	The Gridless Wireless Network (G.W.N.) provides a wireless internet connection areas where a natural disaster has occurred or in communities without Internet access

Level 1

Module	Communications
Inputs	Signal Rx, I2C/SPI from MCU
Outputs	Signal Tx, I2C/SPI to MCU
Functionality	Receive and transmit data through wifi

Module	Power system
Inputs	Power (if charging)
Outputs	Multiple Voltage Levels, Battery Status
Description	Provide power to components

Module	MCU
Inputs	Multiple Voltage Levels(3.3V, 5V), I2C/SPI from Communications, I2C/SPI from Power System, Ethernet Rx
Outputs	Display, I2C/SPI to Communications, Ethernet Tx
Description	Interprets and sends information from the communications module, presents information on display, and communicates with Ethernet connections.

Level 2

MCU
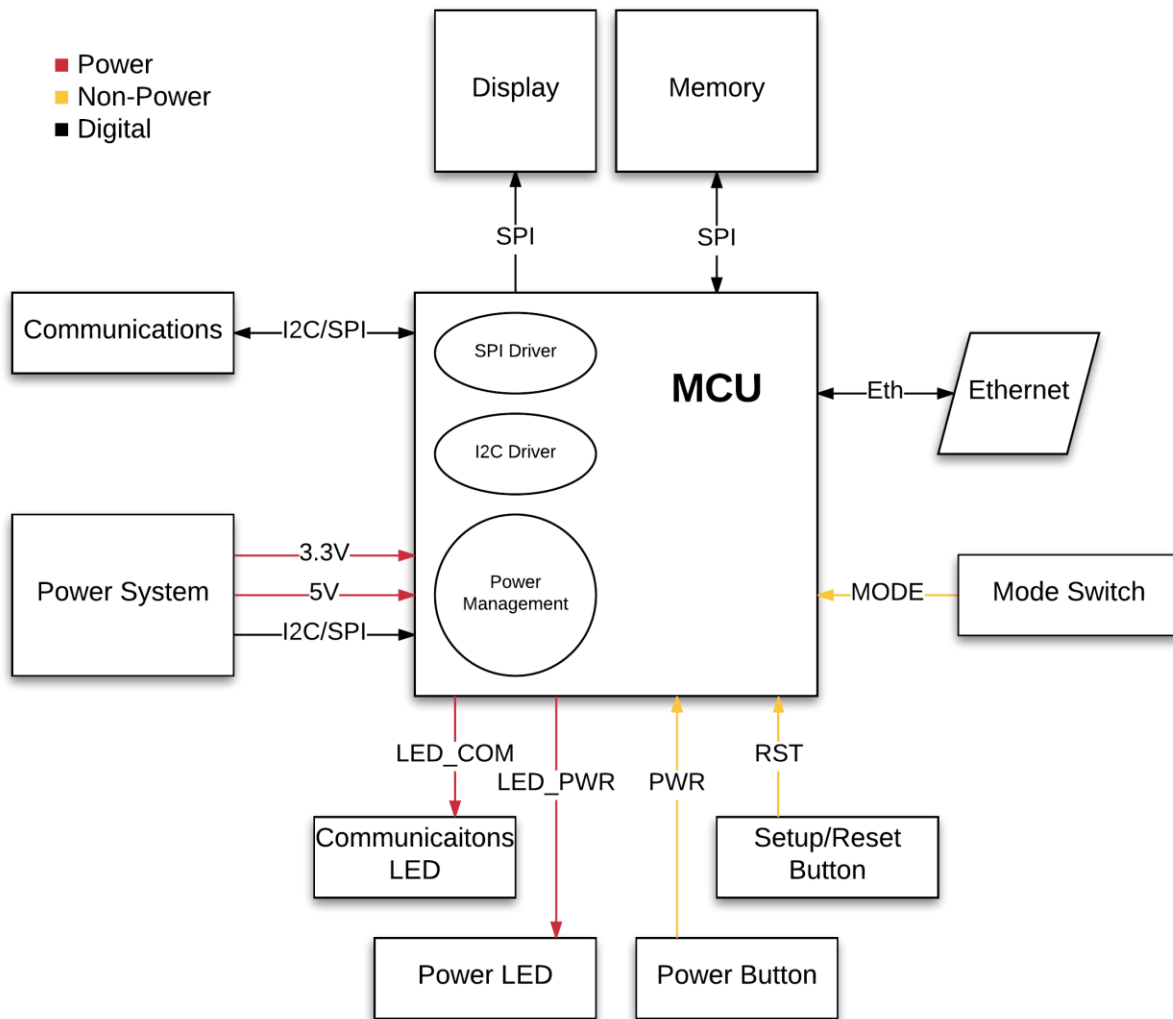
Component	MCU
Inputs	Power Button, Setup/Reset Button, power system I2C/SPI data connection, 5V and 3.3V power, SPI from Memory, Eth, SPI to Communications
Outputs	Power LED, Communications LED, 2x Ethernet Ports, SPI to Memory, SPI to Communications
Description	The component responsible for facilitating data transmission via the transceiver and ethernet connections. Stores information on the Memory unit.

Component	Display
Inputs	SPI from MCU
Outputs	n/a
Description	Display to read out important information such as bandwidth usage, number of users connected, battery life, etc.

Component	Memory
Inputs	SPI from MCU
Outputs	SPI to MCU
Description	Stores data collected by the MCU as well as other software.

Component	Ethernet
Inputs	SPI from MCU
Outputs	SPI to MCU
Description	Ethernet port that allows device to access a wired local area network.

Component	Setup/Reset Button
Inputs	n/a
Outputs	RST
Description	Push Button to send the RST signal to start/restart the wireless internet protocol.

Component	Power Button
Inputs	n/a
Outputs	PWR
Description	Push Button to toggle the device on or off.

Component	Power LED
Inputs	LED_PWR

Outputs	n/a
Description	LED that emits light when the device is powered on.

Component	Communications LED
Inputs	LED_COM
Outputs	n/a
Description	LED that emits light when the device is transmitting a wireless network.

Component	Mode Switch
Inputs	n/a
Outputs	MODE
Description	Switch that determines what

Power System
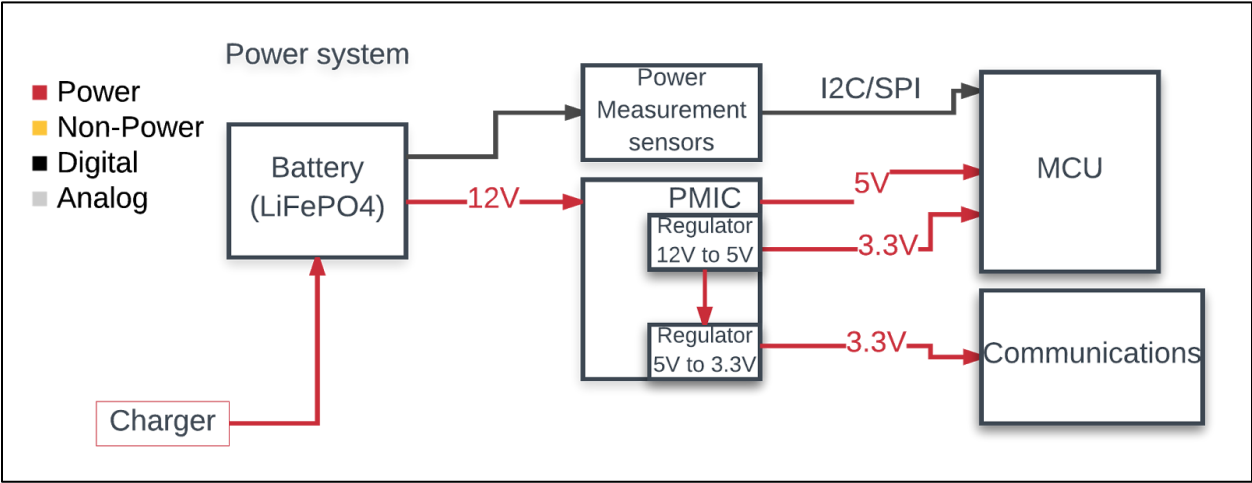
Component	Battery
Inputs	Charger
Outputs	12V voltage
Functionality	Power source for the entire system

Component	Power measurement sensors
Inputs	Battery output power
Outputs	I2C/SPI
Functionality	Measures battery status (output power) and sends it to MCU to analyze power consumption.

Module	Power management integrated circuit (PMIC)
Inputs	12V
Outputs	5V, 3.3V to MCU and Communication Units
Functionality	Providing management of output power, creating multiple stages of output voltages for charging and MCU power input.

Communications
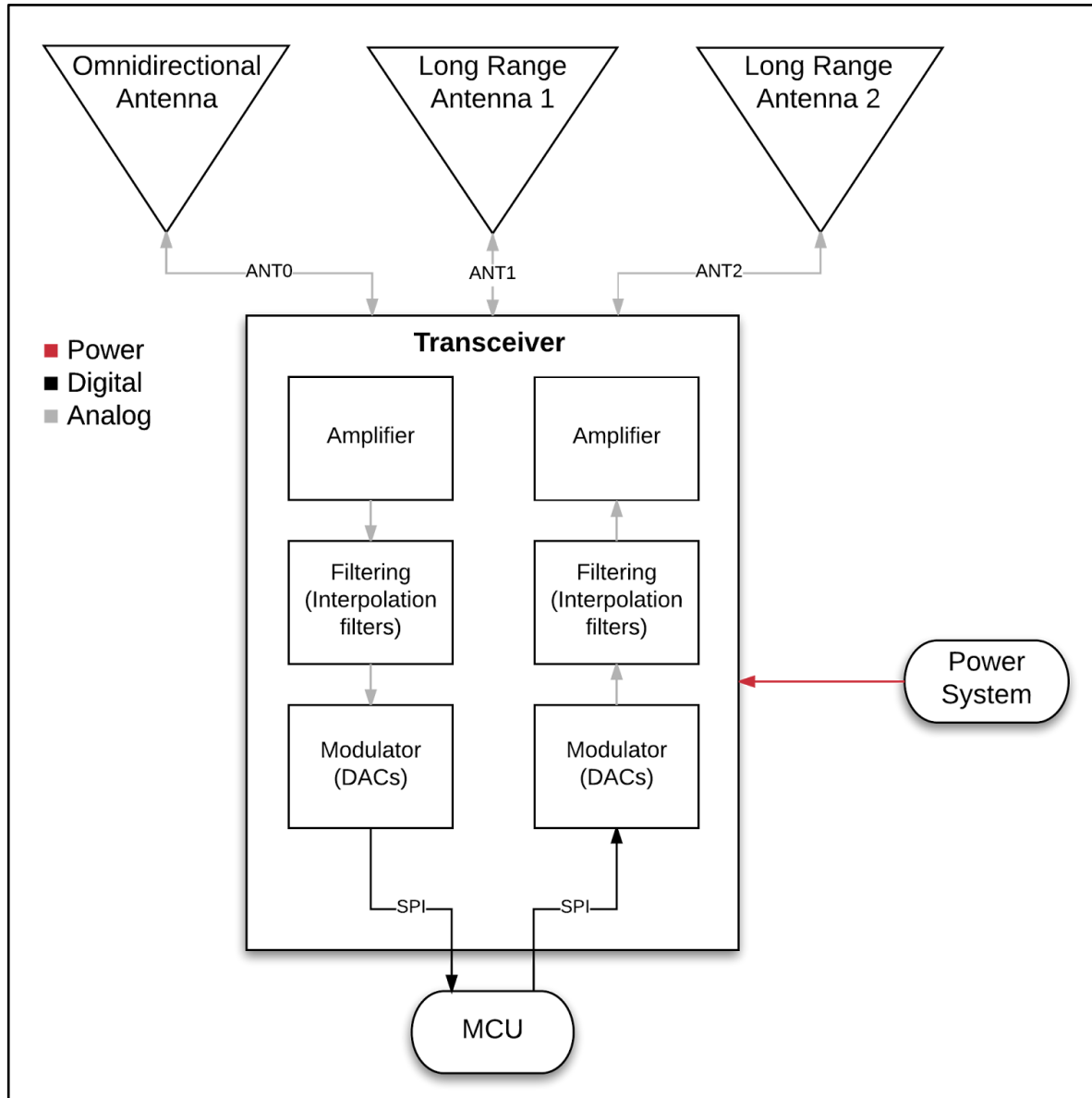
Component	Transceiver
Inputs	Electricity from Power System, SPI from MCU, ANT0, ANT1, ANT2
Outputs	SPI to MCU, ANT0, ANT1, ANT2
Description	Transmit modulated signal and receive analog signals.

Component	Omnidirectional Antenna

Inputs	ANT0
Outputs	ANT0
Description	Generate radio waves covering a limited area.

Component	Long Range Antenna (x2)
Inputs	ANT1 or ANT2
Outputs	ANT1 or ANT2 (same as input)
Description	Generate single direction radio wave.