Homework 5: Detailed Design
Team 12

Version 2.0
December 8, 2020
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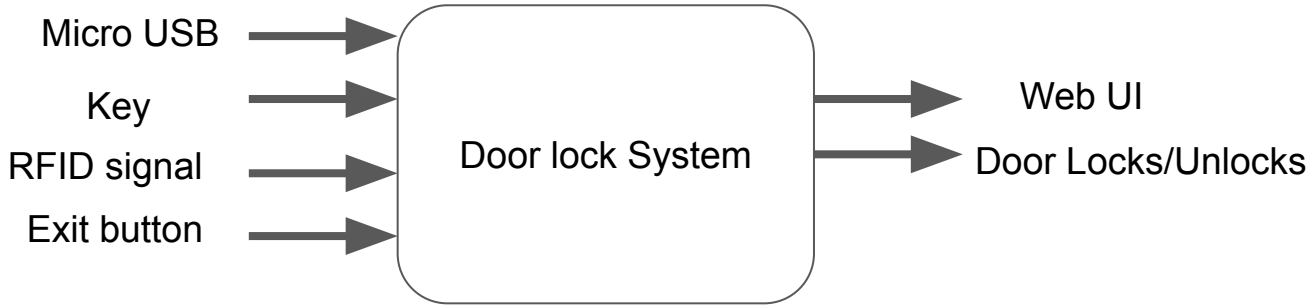
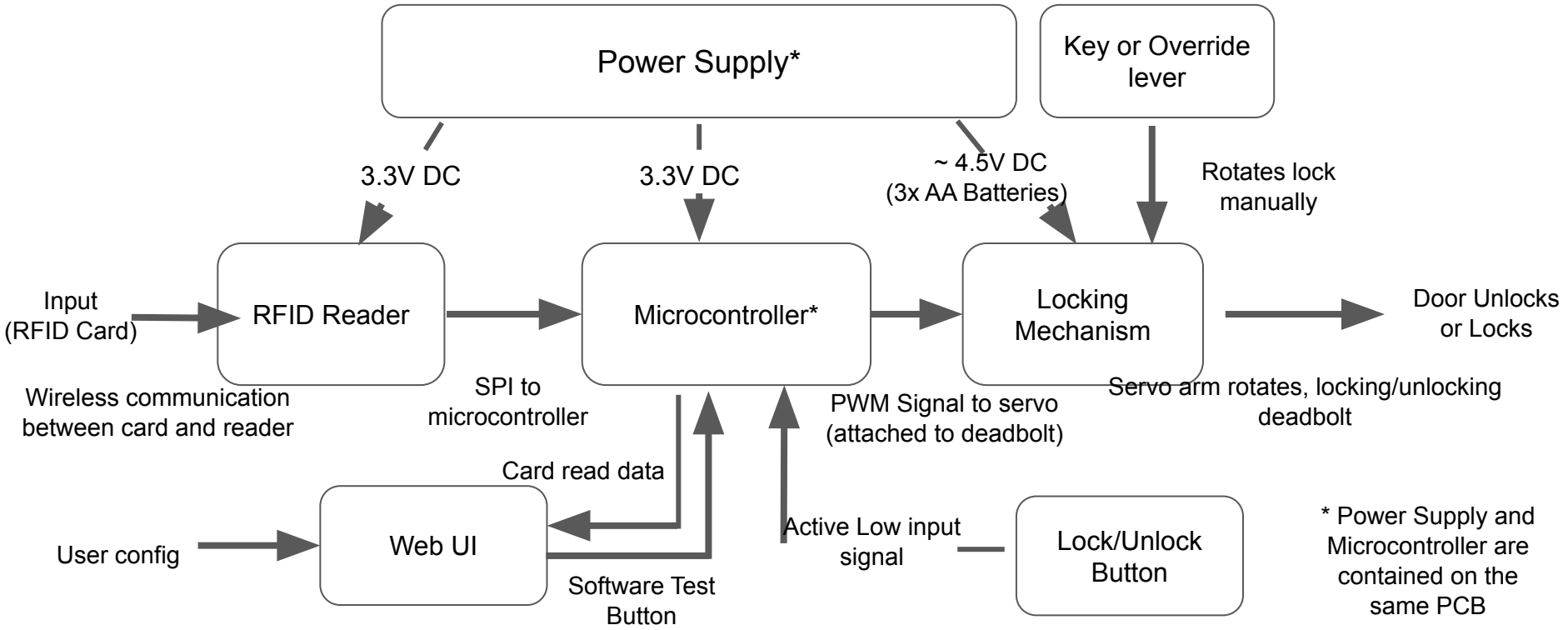
RFID Door Lock: Level 0

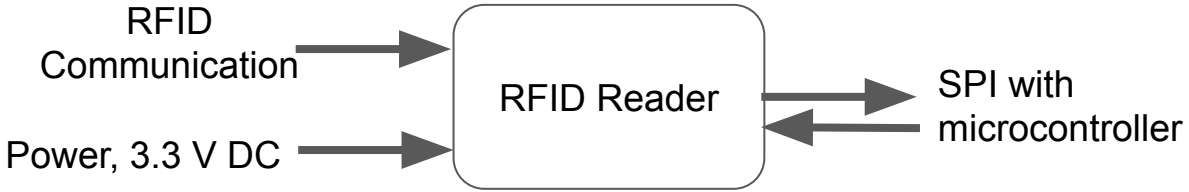


Module	RFID Door Lock System
Inputs:	Key (Can only be input from outside of house) RFID signal read (Can only be used as input from outside house) Exit button (Can only be used as input from inside house) Micro USB (Used to flash code) WebUI for adding user credentials
Outputs:	Servo actuation that locks/unlocks the door WebUI
Functionality:	Door lock mechanism that can be locked/unlocked using a standard key, overridden from the inside, RFID card from the outside, or a button on the inside. Firmware is flashed through the Micro USB port, and settings are accessed through a WebUI

RFID Door Lock: Level 1

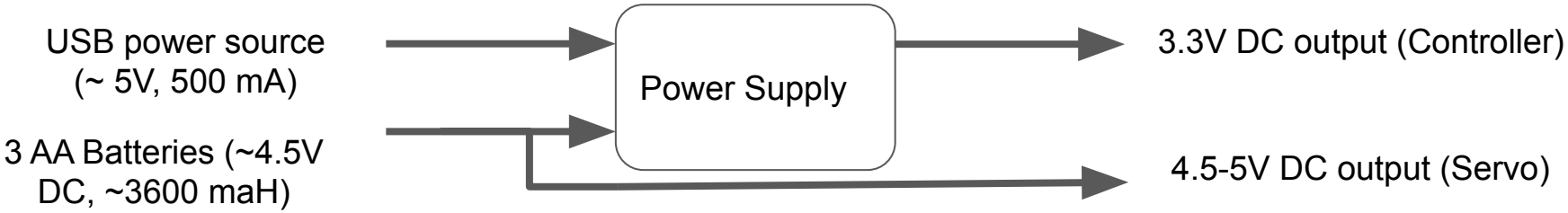


RFID Reader Level 0 (Pre-built Assembly)



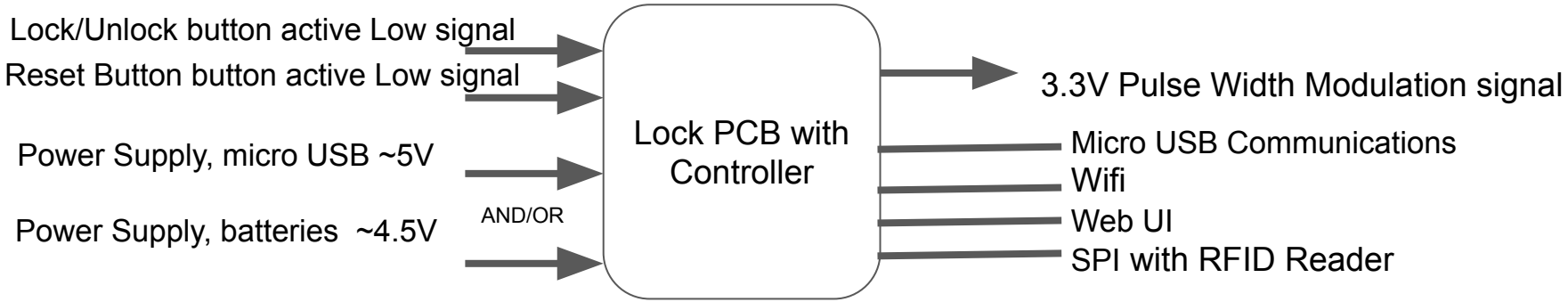
Module	RFID Sensor
Inputs:	Power, 3.3 V ~15mA DC from Lock PCB Wireless communication with RFID Card
I/O:	SPI signal to communicate with Lock PCB Microcontroller with data from RFID/NFC tag
Functionality:	Used to take UID from RFID/NFC tags

Power Supply Level 0



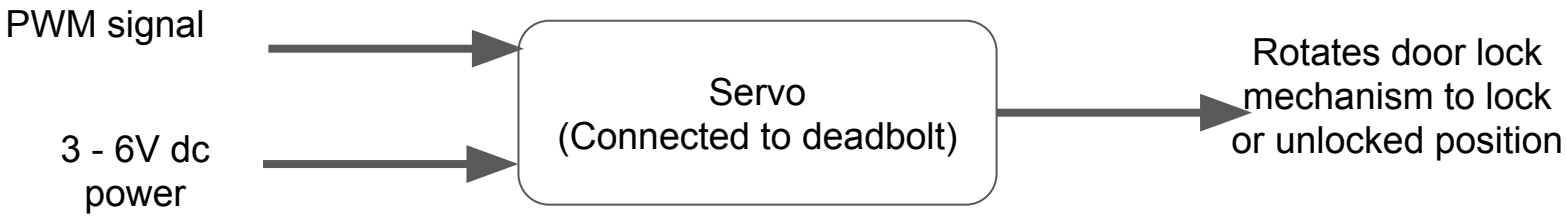
Module	Power Supply
Inputs:	USB power source Battery Power (3 AA batteries)
Outputs:	3.3V dc, ~ 4.5-5V dc
Functionality:	Power Supply, regulates higher voltage inputs down to 3.3V as needed for the microcontroller and RFID sensor. Can take input from either USB or batteries. Servo 3-5V supply bypasses voltage regulator and goes directly to the servo

Lock PCB with Microcontroller: Level 0



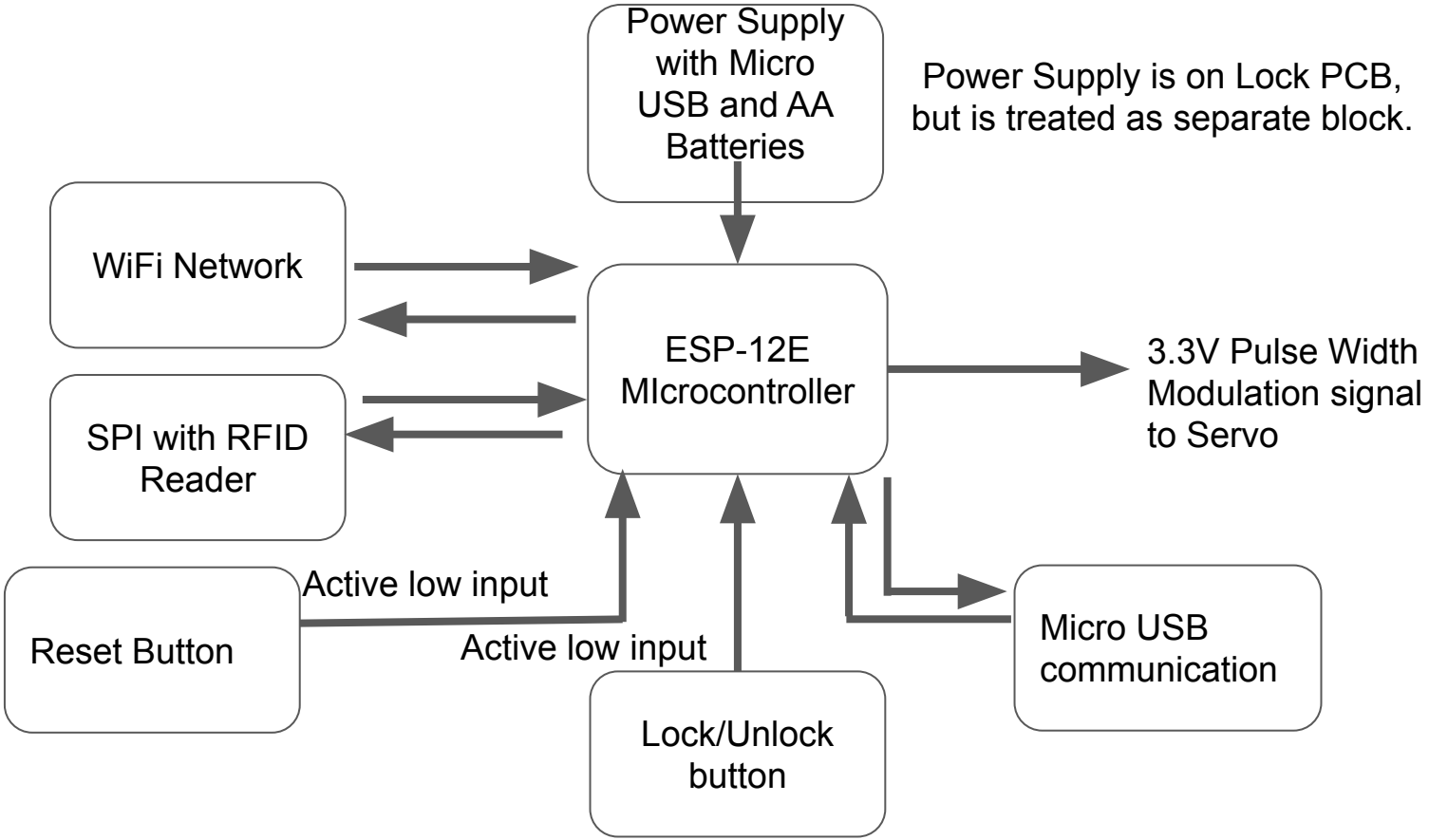
Module	Development Board with ESP 12E processor
Inputs:	From Power Supply: ~5V DC (Micro USB) AND/OR ~4.5 V DC (3 AA Batteries) Reset Button input signal (Resets processor) Lock/Unlock button active low signal to send lock/unlock signal
Outputs:	3.3V Pulse Width Modulation signal to servo to lock or unlocked position Web interface (Used to PWM signal output to servo and view access logs)
I/O	SPI data from RFID reader with tag data WiFi: User configuration, and allow user to store new RFID card data through Web UI Micro USB Communication for programming
Functionality:	Interpretes read data from RFID reader or input from exit button into a PWM signal used to activate servo either to the lock or unlocked position depending on it's last activation. Stores registered RFID card data, checks if RFID card is registered, and time/date of RFID scans.

Servo (Actuator) Pre-Assembled

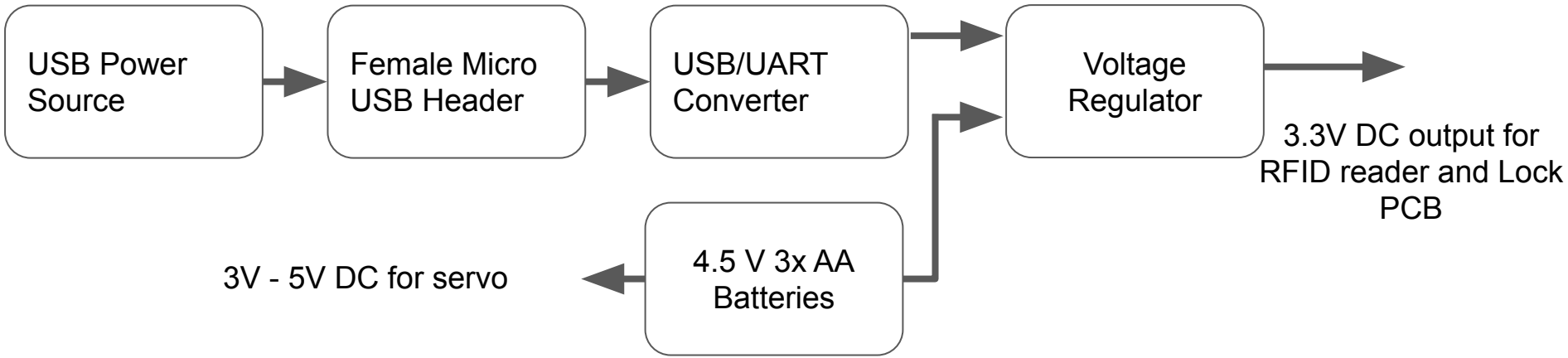


Module	Servo
Inputs:	Pulse Width Modulation signal 3 - 6V dc power
Outputs:	Rotates door lock mechanism
Functionality:	Micro Servo with 180 degree arm rotation. Rotation direction is controlled by Pulse Width Modulation input. Servo arm is connected to deadbolt assembly, which locks/unlocks door.

PCB with Microcontroller: Level 1

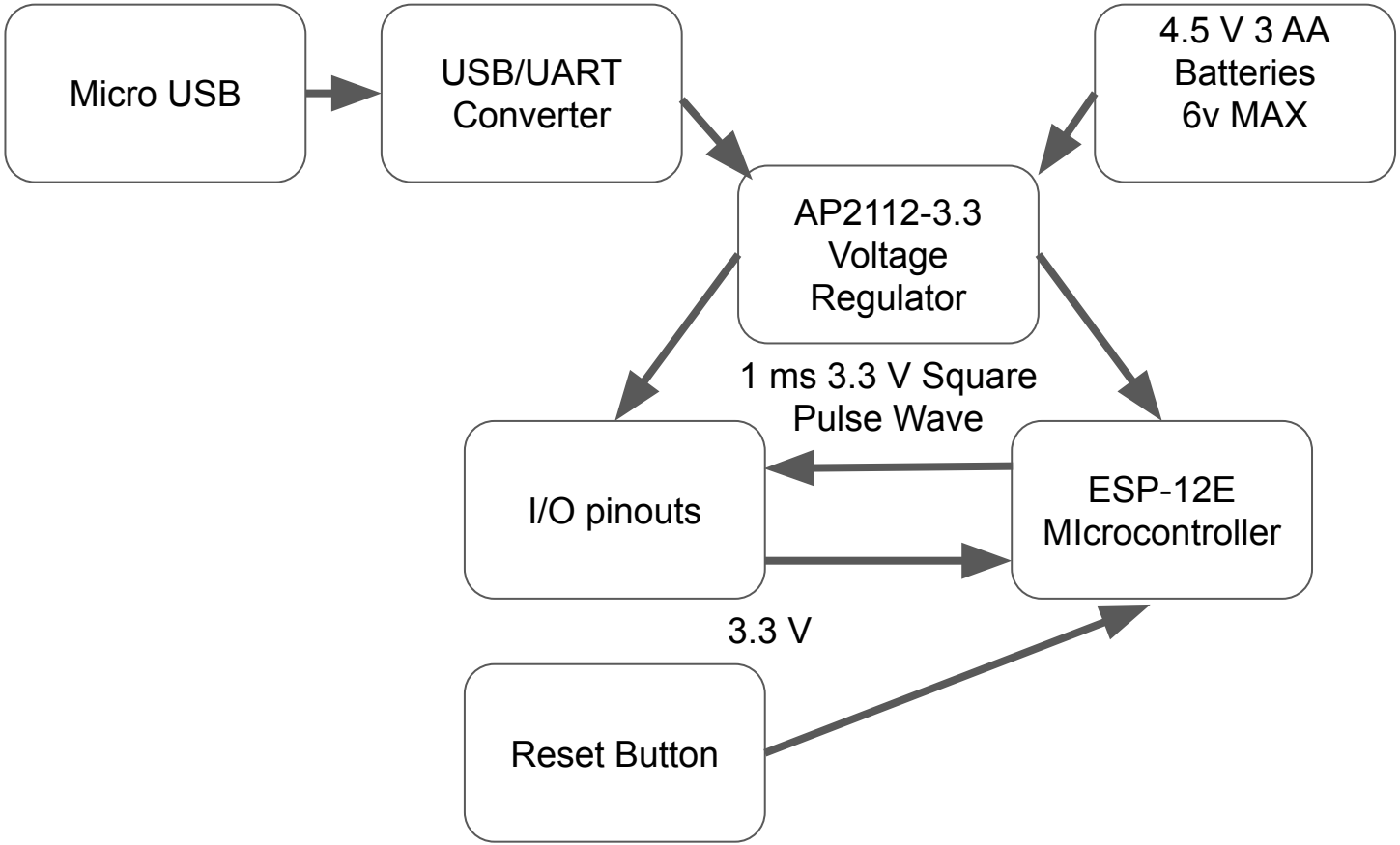


Power Supply: Level 1



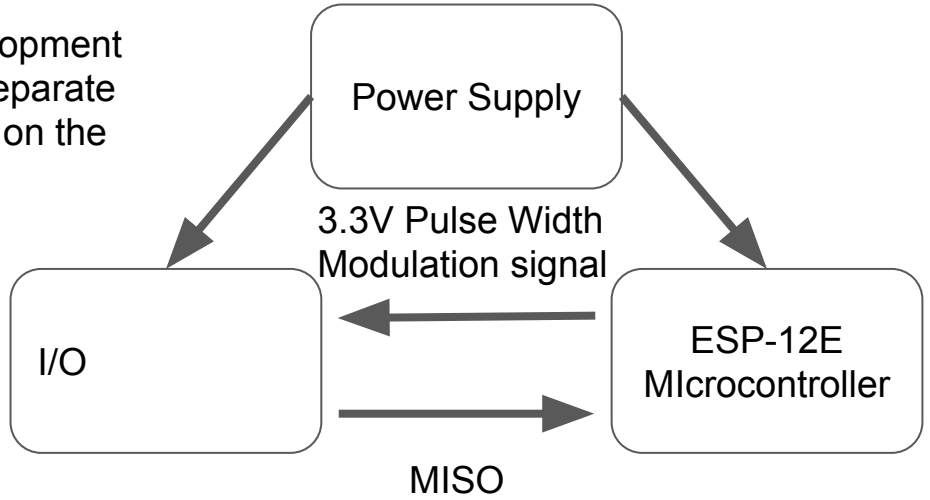
* USB Power will disable the power from the AA batteries. A charge regulator should also have been included to accommodate rechargeables

Development Board Level 2



Development Board Level 1

Power Supply is on development board, but is treated as separate block. This block focuses on the microcontroller



Notes

Draw a high level block diagram of your practicum project showing all inputs and outputs (**Slide 2)**.

Draw a next-level block diagram showing the principal components or modules of your project along with the interconnections between them. Be sure those interconnections are properly described. **(Slide 3).**

For each component or module appearing in that block diagram, draw a high-level block diagram dedicated to it that describes its functionality, inputs, and outputs. **(Slides 4-9)**

Consult the textbook and lecture slides for the proper way to capture block diagrams and to describe functionality, inputs, and outputs. **(Lecture 6 slide 15 and beyond)**

Upload a pdf file to D2L and post a copy on your project wiki.