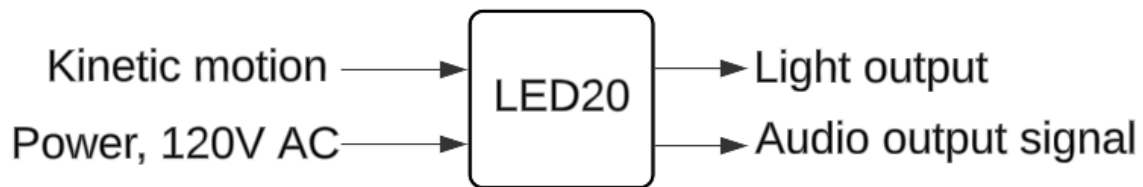


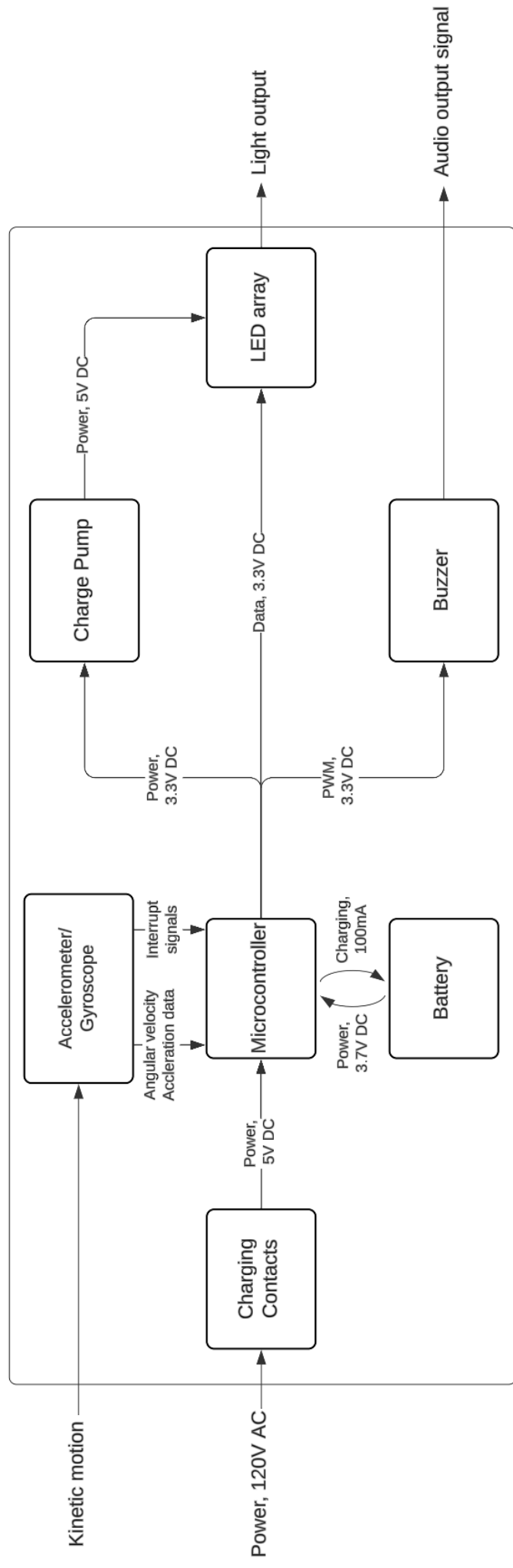
LED 20: Functional Decomposition

LED20: Level 0



<i>Module</i>	LED20
<i>Inputs</i>	Kinetic motion: Significant motion detection Power: 120V AC rms, 60 Hz
<i>Outputs</i>	Light output: LEDs Audio output signal: Buzzer
<i>Functionality</i>	The device is interrupted via a significant motion from the user, producing light and audio outputs.

LED20: Level 1

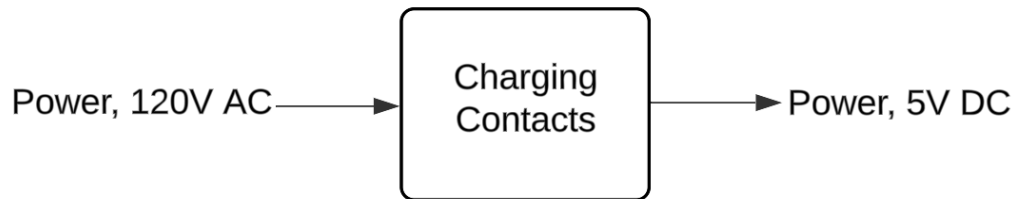


Microcontroller: Level 1



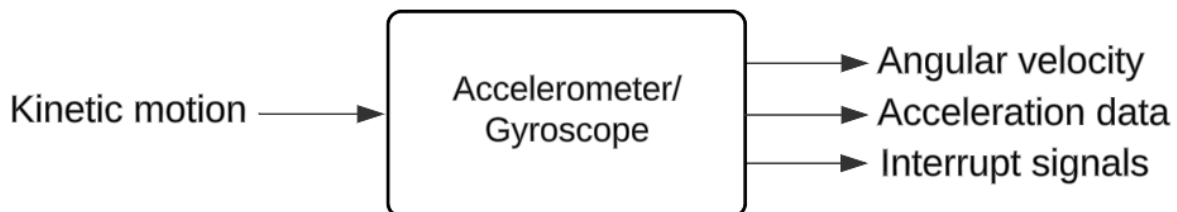
<i>Module</i>	Microcontroller
<i>Inputs</i>	Power: 5V DC from Charging Contacts Power: 3.7V DC from Battery Angular velocity: (-500, 500) degrees per second (DPS) Acceleration data: (0-4) g (acceleration due to gravity $g = 9.81m/s^2$) Interrupt signals: to Accelerometer/Gyroscope
<i>Outputs</i>	Power: 3.3V DC to Charge Pump Data: 3.3V DC to LED array PWM: 3.3V DC to Buzzer
<i>Functionality</i>	Receives 5V DC from Charging Contacts for charging the battery, 3.7V DC from the battery to power self, angular velocity and acceleration data from Accelerometer/Gyroscope for determining when the device is in motion, no longer in motion, and at what orientation, and interrupt signals to Accelerometer/Gyroscope for both waking device up and putting to sleep after a period of unuse. Outputs 3.3V DC to charge pump, 3.3V data signal to LED Array based on angular velocity and acceleration data, and 3.3V PWM signal to Buzzer based on the orientation of the device.

Charging Contacts: Level 1



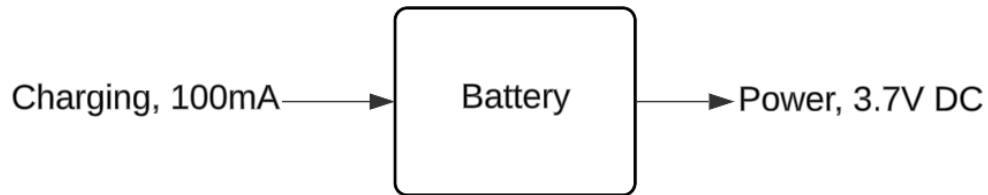
<i>Module</i>	Charging Contacts
<i>Inputs</i>	Power: 120V AC rms, 60 Hz
<i>Outputs</i>	Power: 5V DC
<i>Functionality</i>	Provide wireless charging via conductive contacts

Accelerometer/Gyroscope: Level 1



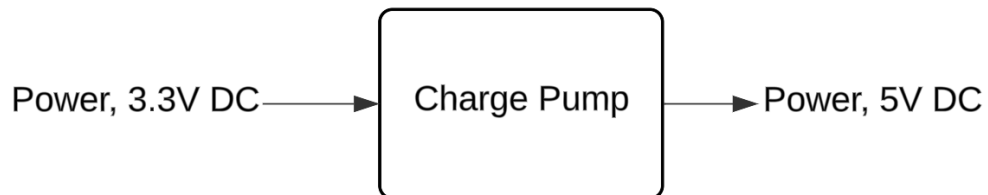
<i>Module</i>	Accelerometer/Gyroscope
<i>Inputs</i>	Kinetic motion: Significant motion detection
<i>Outputs</i>	Angular velocity: (-500, 500) dps Acceleration data: (0-4) g Interrupt signals: to Microcontroller
<i>Functionality</i>	Detects significant motion from the user, relays angular velocity and acceleration data to the Microcontroller, interrupt signals to both wake up and put the Accelerometer/Gyroscope to sleep.

Battery: Level 1



<i>Module</i>	Battery
<i>Inputs</i>	Charging: 100mA, limited by Microcontroller
<i>Outputs</i>	Power: 3.7V DC
<i>Functionality</i>	500mAh LiPo battery, supplies 3.7V DC to Microcontroller

Charge Pump: Level 1



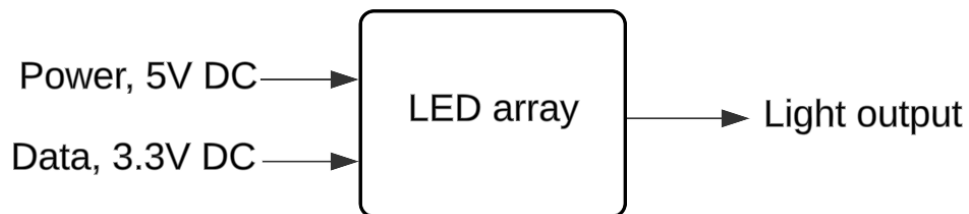
<i>Module</i>	Charge Pump
<i>Inputs</i>	Power: 3.3V DC from Microcontroller
<i>Outputs</i>	Power: 5V DC, 250mA max
<i>Functionality</i>	Converts 3.3V input from Microcontroller to 5V output to power LED Array

Buzzer: Level 1



<i>Module</i>	Buzzer
<i>Inputs</i>	PWM: 3.3V DC
<i>Outputs</i>	Audio output signal: celebratory or disheartening tune
<i>Functionality</i>	Receives 3.3V PWM signal from microcontroller when particular values are read from accelerometer/gyroscope, emits tune based on the read value

LED Array: Level 1



<i>Module</i>	LED Array
<i>Inputs</i>	Power: 5V DC from charge pump Data: 3.3V DC signal from microcontroller
<i>Outputs</i>	Light output: LEDs
<i>Functionality</i>	Illuminates particular LED in the array based on the orientation of the device determined by the accelerometer/gyroscope module