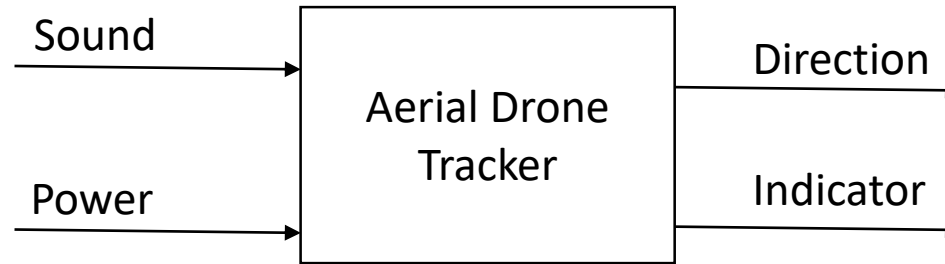
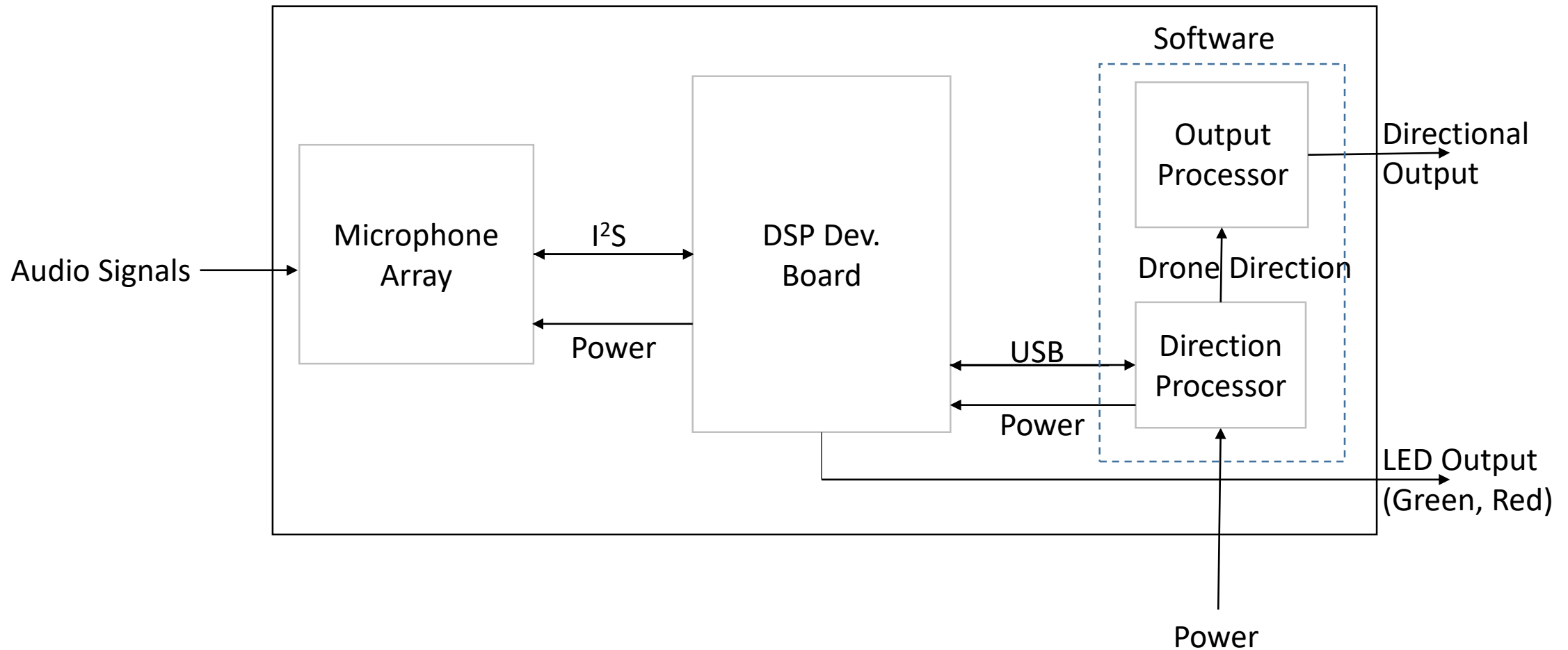


Passive Sonar Aerial Drone Tracker: Level 0

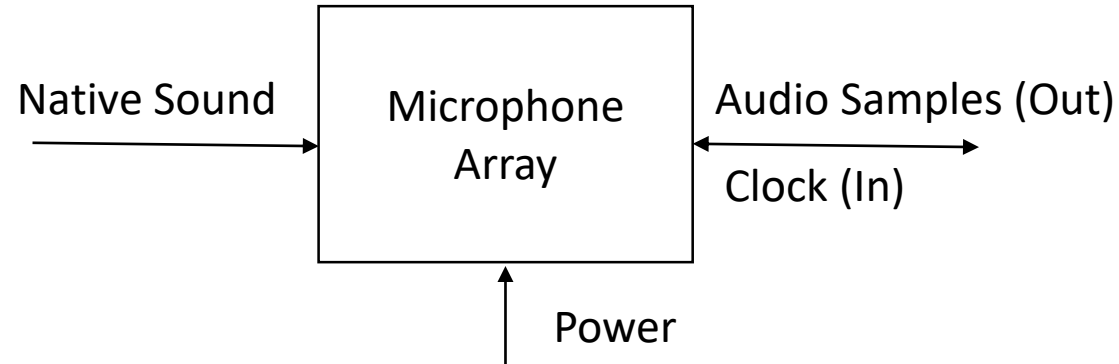


<i>Module</i>	Passive Sonar Aerial Drone Tracker.
<i>Inputs</i>	Sound: Microphone sampling of native audio signals. Power: Laptop power supply.
<i>Outputs</i>	Direction: A visual indicator of the drones location. Indicator: LED system status indicator (Green = okay, Red = not okay)
<i>Functionality</i>	Monitor native audio signals for aerial drone. When drone is present, reports drones location in angles of both azimuth and elevation.

Passive Sonar Aerial Drone Tracker: Level 1

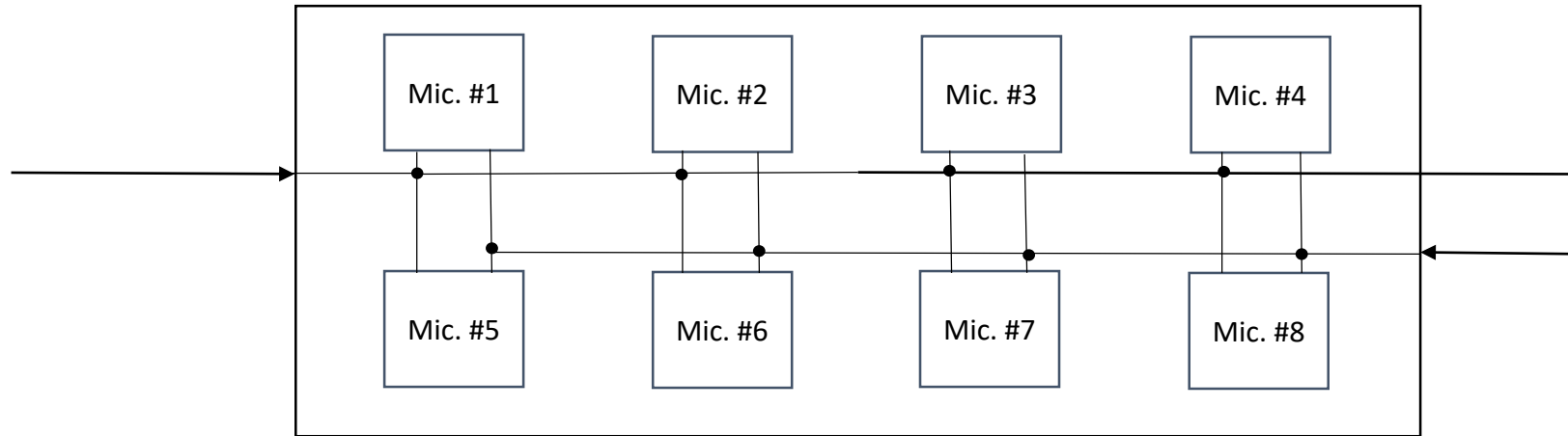


Microphone Array: Level 0



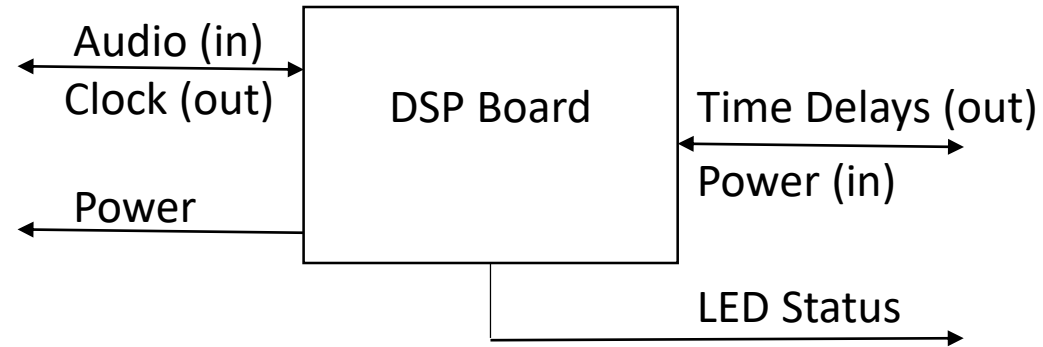
<i>Module</i>	Microphone array
<i>Inputs</i>	Power: 3.3V from DSP board. Sound: The microphones receive and record native sound. Clock: The BCLK and WS of the I ² S protocol.
<i>Outputs</i>	Audio Sample: Recorded sound is then sent to the DSP board using a bus connection operating I ² S protocol.
<i>Functionality</i>	Receives and recordings audio from surroundings and sends samples to DSP at sampling frequency set by the clock signal.

Microphone Array: Level 1



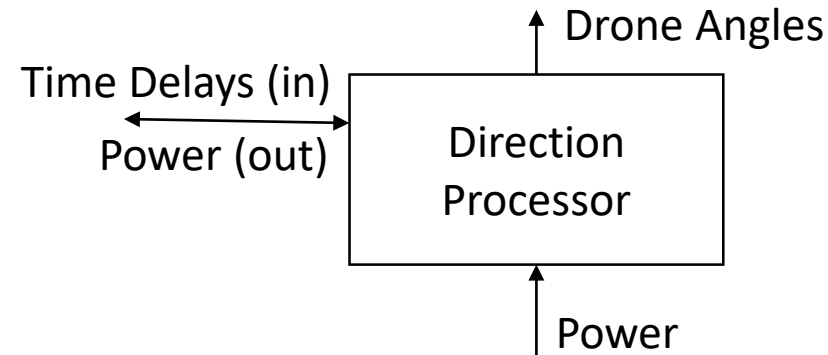
<i>Module</i>	Microphone Array (ICS-52000 Microphones)
<i>Inputs</i>	Sounds: From users environment. Power: 1.8-3.3V from DSP board. Clock: SCK and WS signals from DSP board (12.288MHz for 48k).
<i>Outputs</i>	Audio Samples: All microphones share a common bus line to the DSP board. Output follows I ² S protocols.
<i>Functionality</i>	The microphones receive and record audio samples. Microphones are I ² S slave devices. Sampling speed is 1/256 the clock frequency.

DSP Board: Level 0



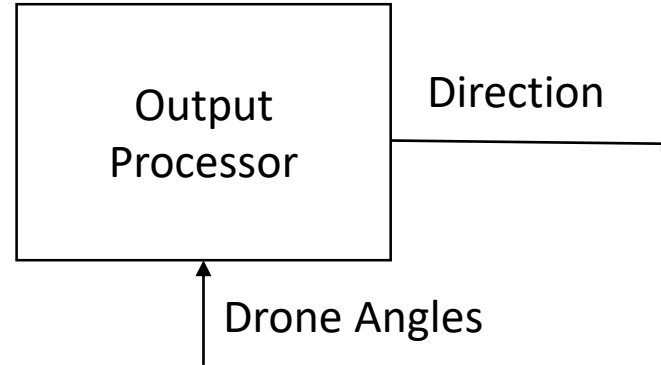
<i>Module</i>	DSP Board (board name here)
<i>Inputs</i>	Audio(in): Filtered (50Hz-20kHz) samples from the mic. array using I ² S protocol. Power: 5V from USB connection.
<i>Outputs</i>	Time Delays: Calculated time delays to direction processor using USB protocols. Power: 1.8-3.3V (1-1.5mA/mic.) to the microphone array. LED Status: LED on DSP Dev board indicates system status (Green = Okay). Clock(out): I ² S protocol SCK and WS to the microphone array.
<i>Functionality</i>	Takes the audio samples from microphones, performs cross-correlation, and sends the calculated time delays to the Direction Processor via USB.

Direction Processor: Level 0



<i>Module</i>	Direction Processor
<i>Inputs</i>	Time Delays: The calculated time delays from DSP board via USB. Power: Laptop power supply
<i>Outputs</i>	Power: 5V via USB. Drone Angles: The azimuth and elevation angles of the drone.
<i>Functionality</i>	Receives time delays from DSP and preforms calculations to derive drones direction and send the angles to the Output processor.

Output Processor: Level 0



<i>Module</i>	Output Processor
<i>Inputs</i>	Drone Angles: The azimuth and elevation angles calculated by the direction processor.
<i>Outputs</i>	Direction: Locate the drone using an as of now undefined display method.
<i>Functionality</i>	Receives the angles to located the drone and turns them into an easily visible display.