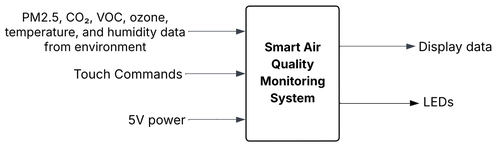
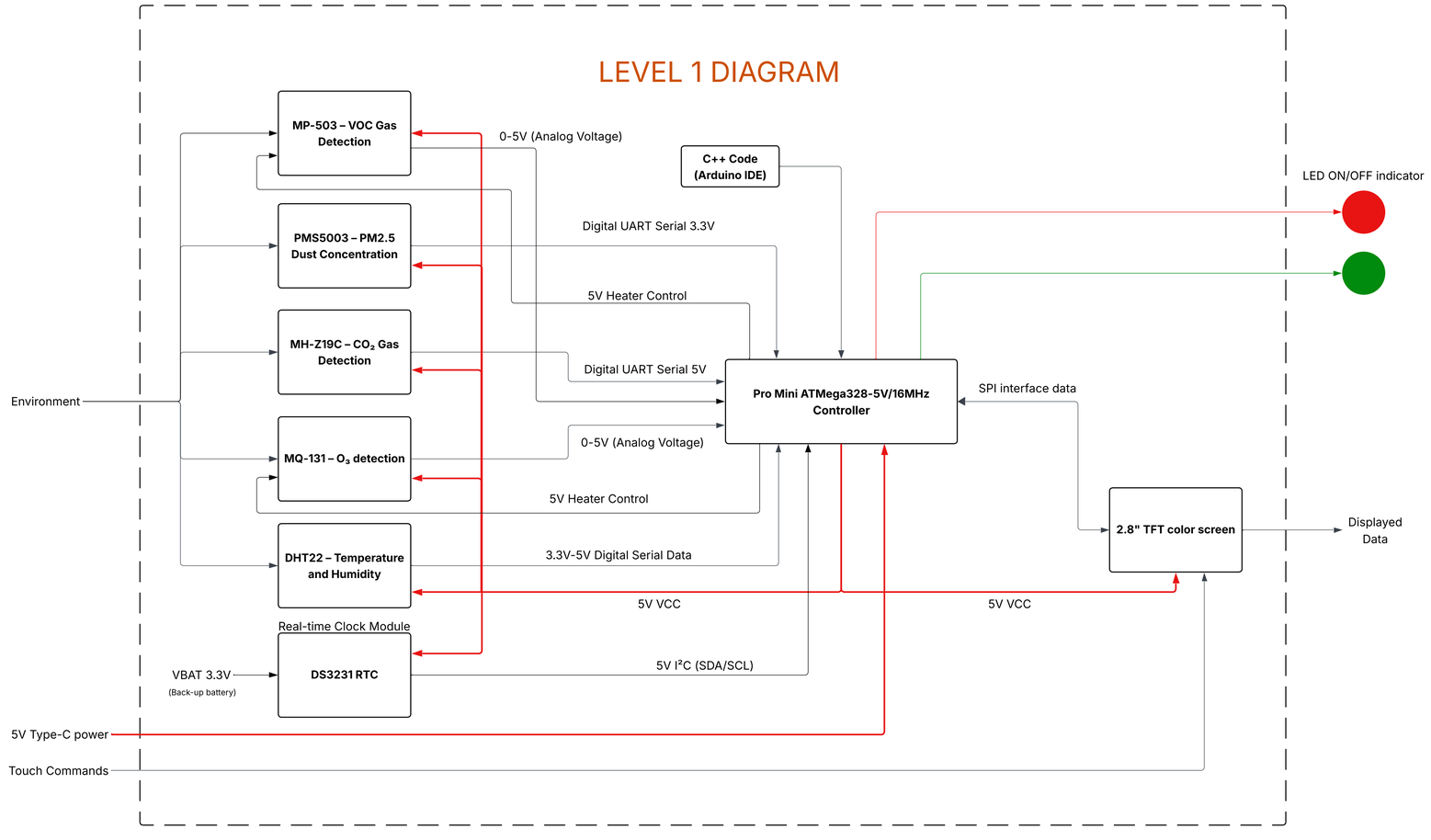
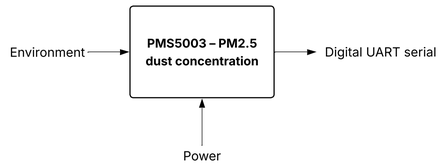
LEVEL 0 DIAGRAM



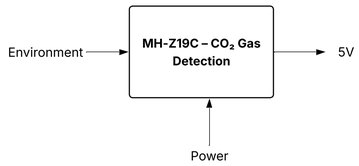
Module	Smart Air Quality Monitoring System
Inputs	PM2.5, CO_2, VOC, ozone, temperature, and humidity data from environment Touch Commands 5V Power
Outputs	Visual data interface via touchscreen LEDs indicating system ON/OFF
Functionality	Visualize the concentration of particulate matter, gases, humidity, and temperature over time in a given environment.

LEVEL 1 DIAGRAM

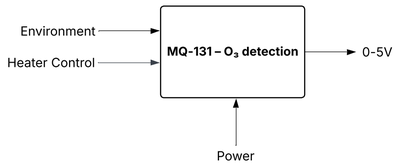




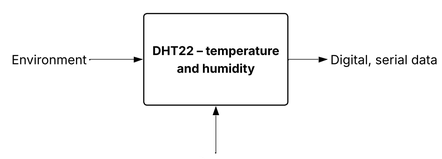
Module	PMS5003 – PM2.5 dust concentration
Inputs	Air from the surrounding environment Power: 5V DC peak from Microcontroller
Outputs	PM2.5 (μg/m³) UART TX -> 3.3V TTL serial
Functionality	Measures particle counts using laser scattering and communicates the data through UART to the MC. Constant reporting every second



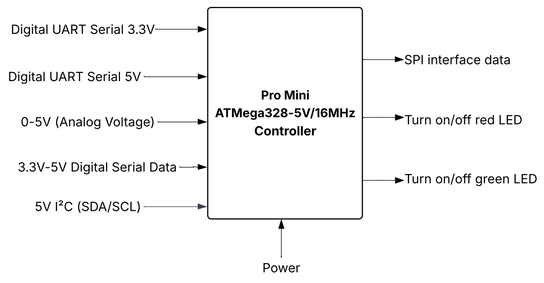
Module	MH-Z19C – CO_2 Gas Detection
Inputs	Air from the surrounding environment Power: 5V DC peak from Microcontroller
Outputs	CO_2 in ppm using Digital UART Serial 5V
Functionality	Detects carbon dioxide levels using non-dispersive infrared (NDIR) absorption and outputs CO_2 concentration in ppm.



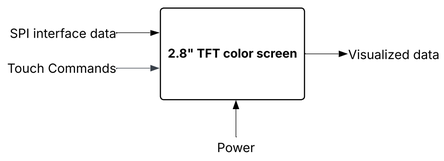
Module	MQ-131 – ozone (O_3) and VOC gas detection
Inputs	Air from the surrounding environment 5V Heater Control From Arduino to heat the sensor element Power: 5V DC peak from Microcontroller
Outputs	O_3 in PPB Analog voltage: 0-5V proportional to gas concentration
Functionality	Uses a metal oxide semiconductor whose resistance decreases w/ higher ozone levels. Outputs analog voltage proportional to deteced ozone levels



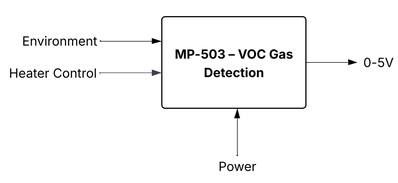
Module	DHT22 – Temperature and humidity sensor
Inputs	Air from the surrounding environment Power: 3.3-6V DC from Microcontroller
Outputs	Digital signal: serial data in 40-bit packets every 2 seconds
Functionality	Uses a capacitive humidity sensor & thermistor. Converts analog readings to digital signals internally to send out to MC via a direct single wire



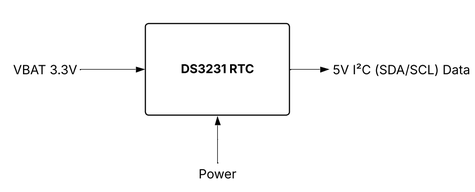
Module	Pro Mini ATMega328-5V/16MHz Controller
Inputs	Digital UART serial data from PMS5003 sensor (3.3V) Digital UART serial data from MH-Z19C Sensor (5V) 0-5V (Analog Voltage) from MQ-131 and VOC sensors 3.3V-5V Digital Serial Data from DHT22 sensor Power input: 5V from power bank via USB-C cable 5V I²C (SDA/SCL) data from DS3231 RTC
Outputs	SPI Interface data to TFT screen Turns on green LED when device is sensing data Turns on red LED when device is not actively sensing data
Functionality	The controller takes in all the data from the sensors and displays it on a 2.8" screen to visualize readings. Also tells the user if the device currently sensing via a green and red LED.



Module	2.8" TFT color screen
Inputs	SPI interface data from the controller Power: 5V DC peak from Microcontroller Touch Commands
Outputs	Visual, color coded readings from sensor Ouputs graphs of data over time
Functionality	To easily visualize the current and past levels of dust, temperature, humidity, ozone, CO2, and VOC in a given environment and sends touch commands back to arduino through UART.



Module	MP-503 – VOC gas detection
Inputs	Air from the surrounding environment 5V Heater Control From Arduino to heat the sensor element Power: 5V DC peak from Microcontroller
Outputs	0-5V proportional to gas concentration
Functionality	Uses a metal oxide semiconductor whose resistance decreases w/ higher gas levels. Outputs analog voltage proportional to deteced gas levels, Detects VOCs, CO, NH3, ethanol, formaldehyde etc.



Module	Real-time Clock Module
Inputs	Power: 3.3 - 5V DC from Microcontroller Power: 3.3V DC from CR2032 Battery during power loss
Outputs	I2C data, serial 5V, (SDA/SCL)
Functionality	Keeps accurate track of time- seconds, minutes, hours, day, date, month, year- even when the power to the main system is off