

21M.370 Digital Instrument Design

PCB overview

This document covers how you can use available pins on the PCB breakout. There are three sections:

1. description of pin functionality
2. chart of pin functionality by pin
3. pictures of pin locations on the PCB

Pin functionality

There are several types of pin functions:

- analog: reads continuous analog values. In our system we stream these values to python at the data rate we specify.
- digital: reads only high or low values, e.g. 0 and 1. In our system when a digital pin changes state it sends the new state immediately, and then streams the current state at the data rate we specify. We stream the state because it is possible that changes of state may be lost when transmitted over wifi.
- I2C and SPI: special functions for digital communication to digital sensors
- DAC and analog/digital output: currently not implemented in our system.
- CapSense: capacitive sensing using selected analog pins of the ESP32.

If a pin is not functioning the way you expect, review the details on that pin's usage on the chart below. Note that when using wifi many of the analog pins are not available for analog input, but are still usable for digital input.

pin functionality by pin

	<i>PCB label</i>	<i>ESP32 pin</i>	<i>possible uses</i>	<i>alternate PCB location</i>	<i>notes</i>
Analog pins					
A0	0	27	Analog IO, capSense		
A1	1	33	Analog IO, capSense		
A2	2	32	Analog IO, capSense		
A3	3	14	Analog IO, capSense		outputs PWM signal at boot
A4	4	4	Analog IO, capSense		
A5	5	0	Analog IO, capSense		pullup, outputs PWM on reset
A6	6	15	Analog IO, capSense		
A7	7	13	Analog IO, capSense	PCB LED	
A8	8	36	Analog input only		low-noise?
A9	9	39	Analog input only		low-noise?
SPI					
CLK	CLK	18	Digital IO		digital IO only
MISO	MISO	19	Digital IO		digital IO only
MOSI	MOSI	23	Digital IO		digital IO only
CS0	CS0	2	Analog IO, capSense	Aux	

	<i>PCB label</i>	<i>ESP32 pin</i>	<i>possible uses</i>	<i>alternate PCB location</i>	<i>notes</i>
CS1	CS1	12	Analog IO, capSense		boot fail if pulled high
I2C					
SDA	SDA	21	Digital IO		digital IO only
SCL	SCL	22	Digital IO		digital IO only, ESP32 built-in led
Controls on PCB					
Button		34	Analog input only		pullup
Button		35	Analog input only		pullup
LED		13	Analog IO, capSense	A7	
Aux					
	CS0	2	Analog IO, capSense	SPI	
	MIDI	5	Digital IO		digital IO only
	25/DAC1	25	Analog IO, DAC		
	26/DAC2	26	Analog IO, DAC		

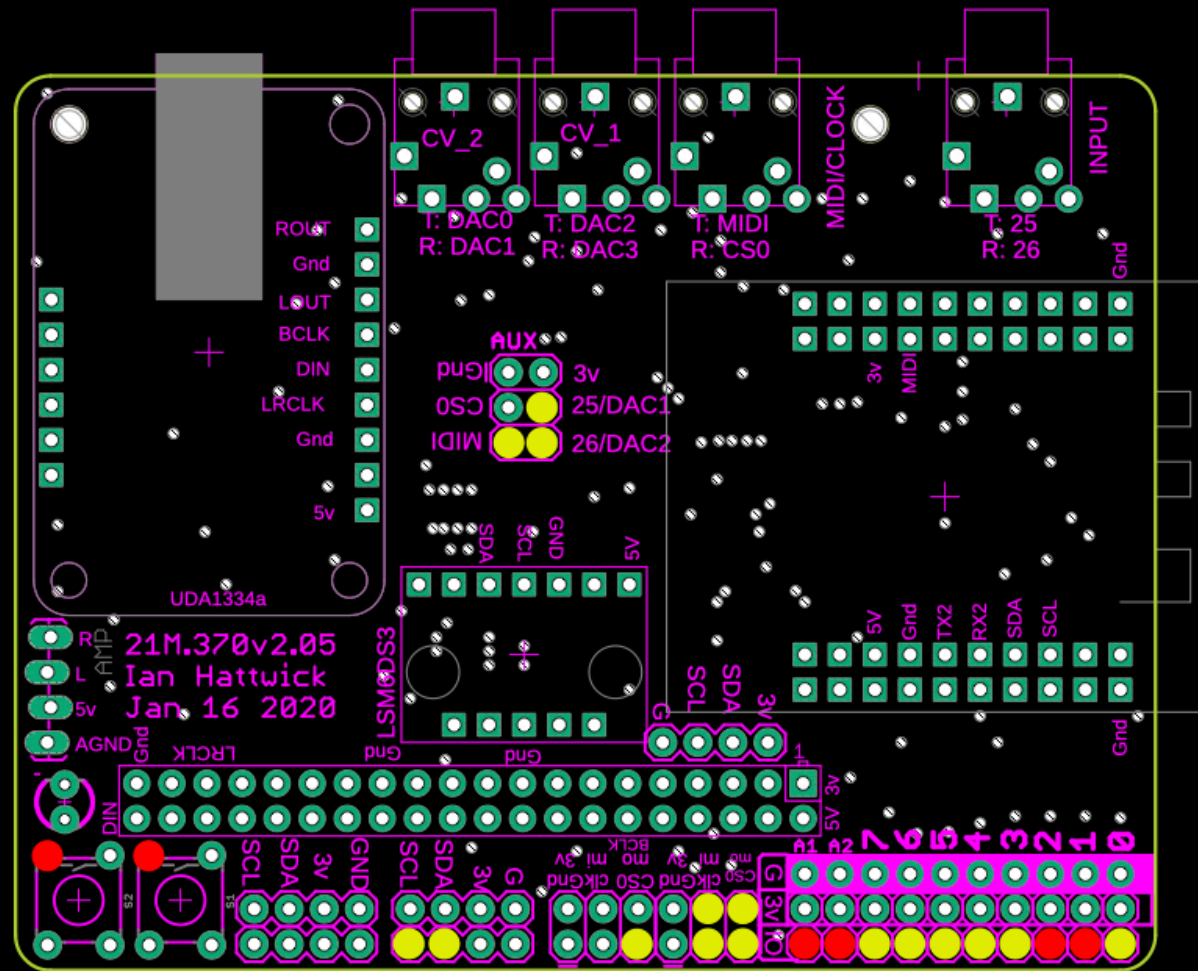
21M.370 Hardware pin functions

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Inputs when using WiFi

- Analog input
- Digital input

Pins located at multiple locations on the board are only colored at one location



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Inputs when using serial

- Analog input
- Digital input

