

Overview:

This project is intended to be an intuitive, contactless way for multiple users to scan and record their temperature. The system alerts the user if a fever is detected via an OLED screen and an audible noise. The user information is stored onto a micro SD card until it is manually deleted.

Electrical Specifications:

Part	Electrical Specifications
Raspberry Pi Zero W	5 v, 2 mA
128x32 Mini OLED Display	5 v, 21.1 mA
HDR-F-2.54_1x2 (speaker)	5 v, 500mA
IR Beam Break Sensor	3.3 v, 10mA
Melexis Contactless Infrared Sensor - MLX90614	3.3v, 25mA

User Guide:

First plug the device in. To start a new scan, wave your hand between the beam break sensor mounts. This will display your patient number and instruct you to place your head in front of the scanner. Follow these instructions, and it will display the measured temperature and alert you if it detects a fever. To access the stored patient data, you must SSH into the Linux system running on the Raspberry Pi Zero, and open the file "User_Data.csv".

Developer Guide:

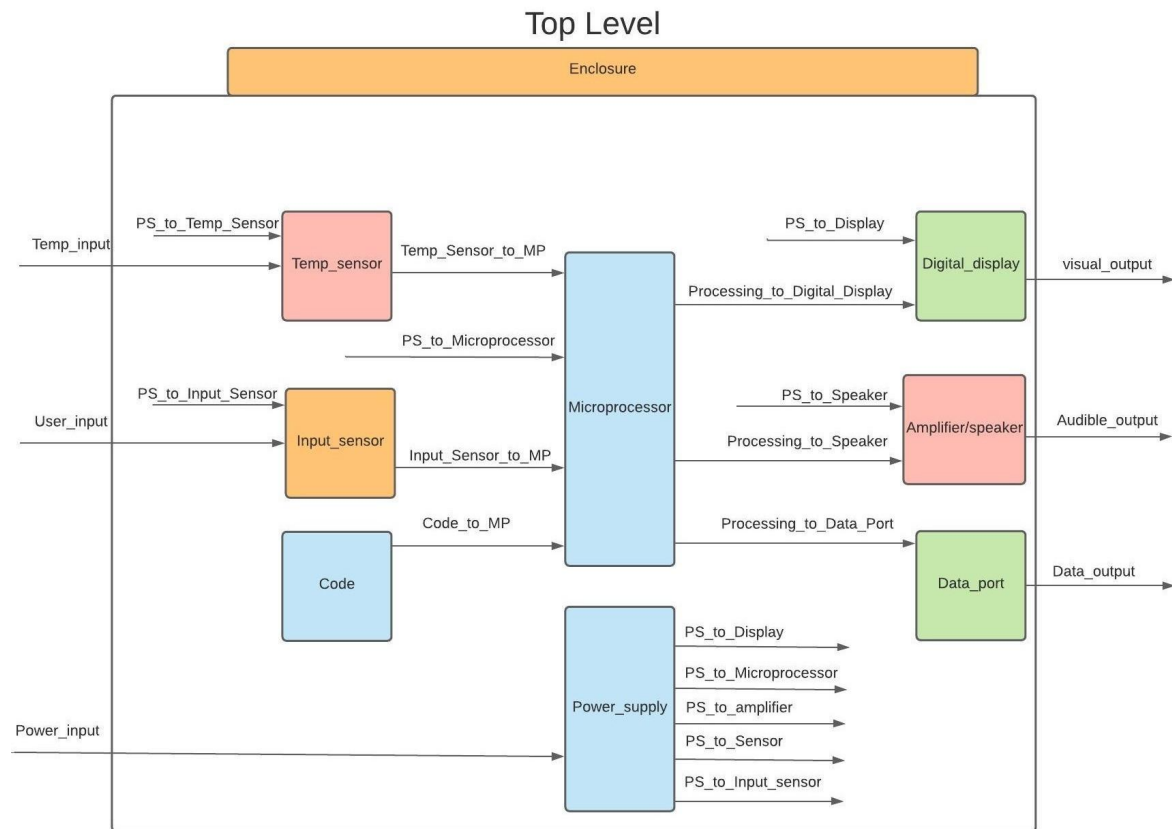


Figure 1: Top level block diagram

This figure shows the communication between the different parts of the system. In order for the system to be contactless, the temperature sensor needs to be an infrared sensor, and the input sensor needs to be a beam break. The beam break sensor is essentially acting as a button that is used to detect when the user is ready to begin a scan. The data port also has options that would work, such as a USB flash drive, or an SD card. The amplifier is built into the PCB, and the temperature sensor and digital display both communicate with the processor through an I2C bus built into the PCB. The power supply is built into the Raspberry Pi Zero that also functions as the microprocessor.

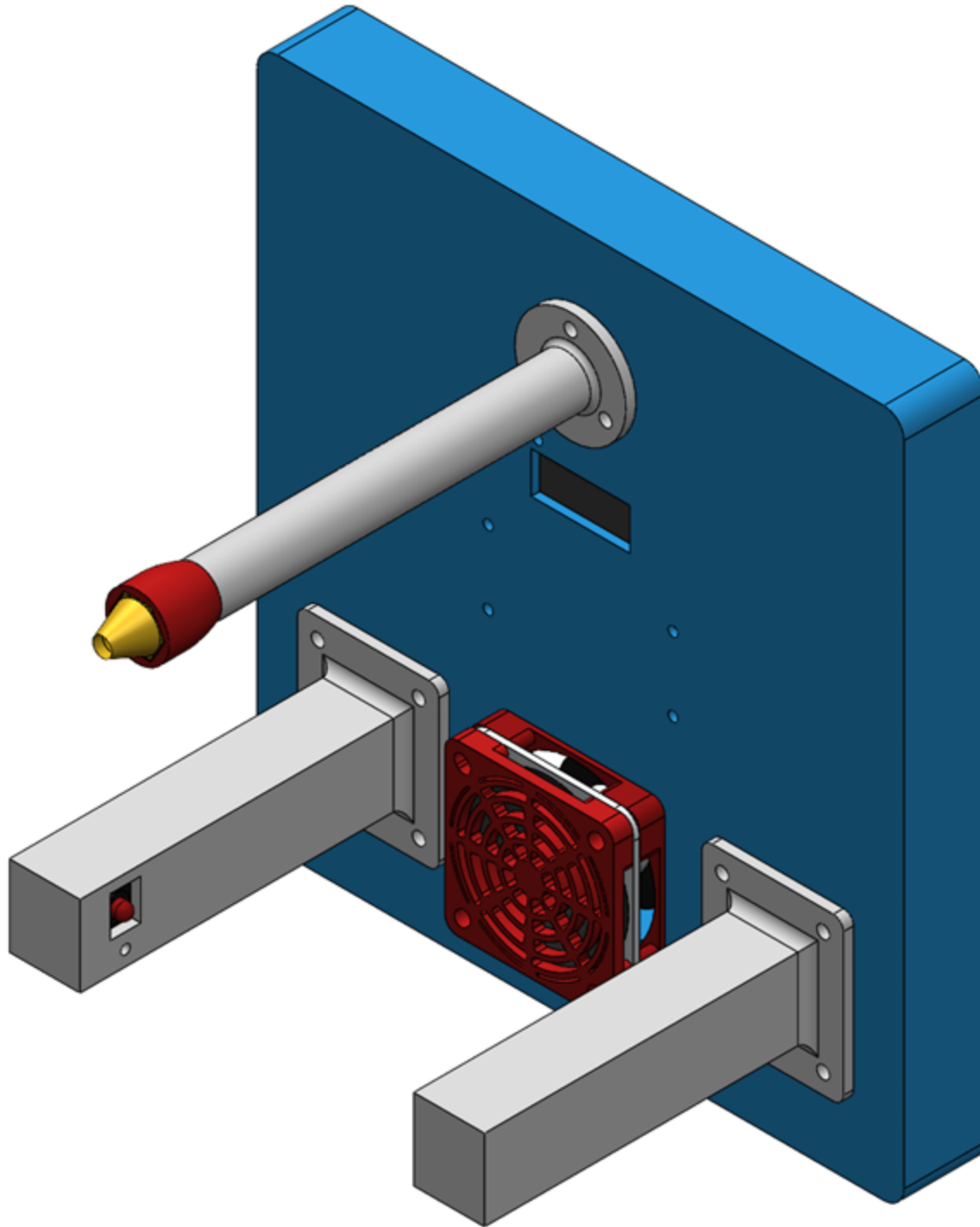


Figure 2: 3D model of the device

The device enclosure was mostly 3D printed in 7 parts; the backboard(blue), the temperature sensor mount (top white), the temperature sensor end (top red), the left and right beam break sensor mounts (bottom white) and the speaker mount and grill (bottom red). It also requires a brass fitting to focus the temperature scanner, and several screws to attach the pieces together. The exact screws necessary are shown in the “Part Information” section of this guide.

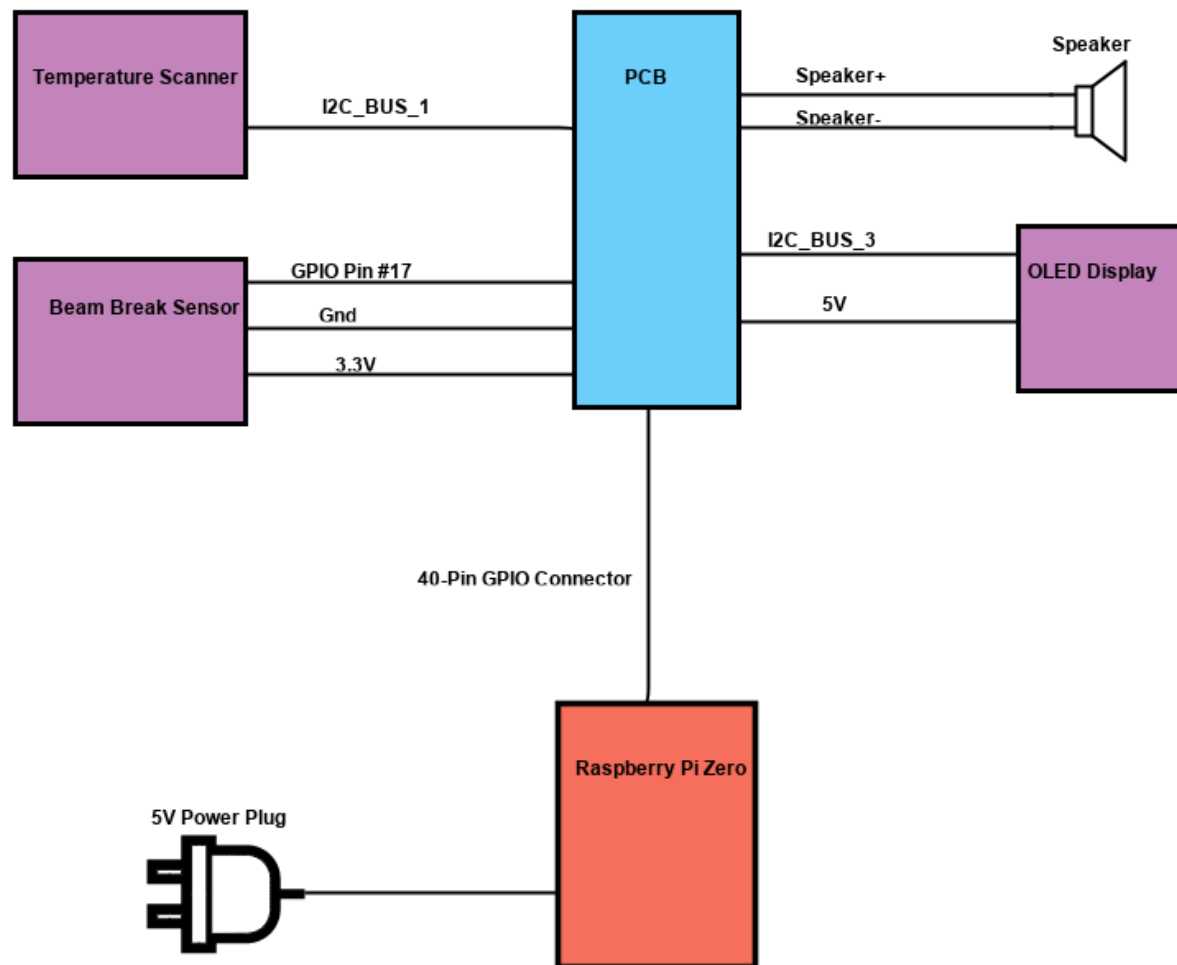


Figure 3: Top level system schematic

This is the top level schematic of the system. The Raspberry Pi is connected directly on to the PCB through a 40-pin GPIO connector, and provides the power and processing to the rest of the system. The PCB also has a 40-pin GPIO passthrough so that the components can connect to it as if they were connected directly to the Raspberry Pi, and allow for additional components to be connected later.

PCB Information:

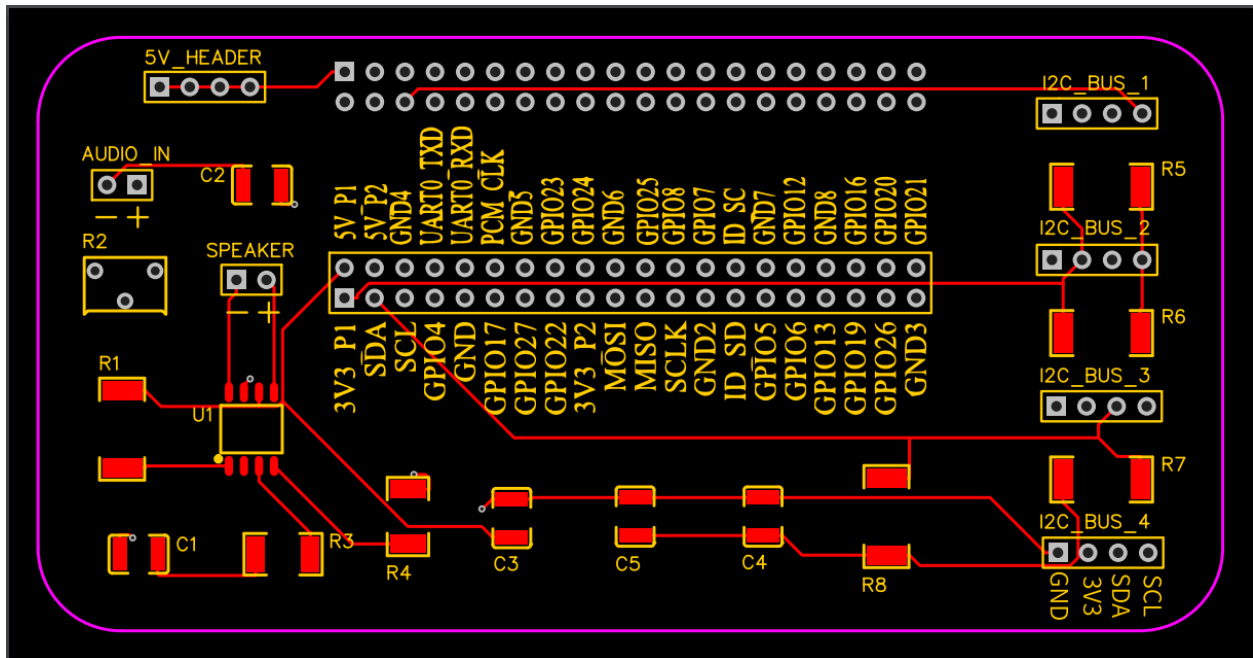


Figure 4: PCB layout. Printed on a 100x50mm board. Component values are shown in the “Part Information” section of this guide.

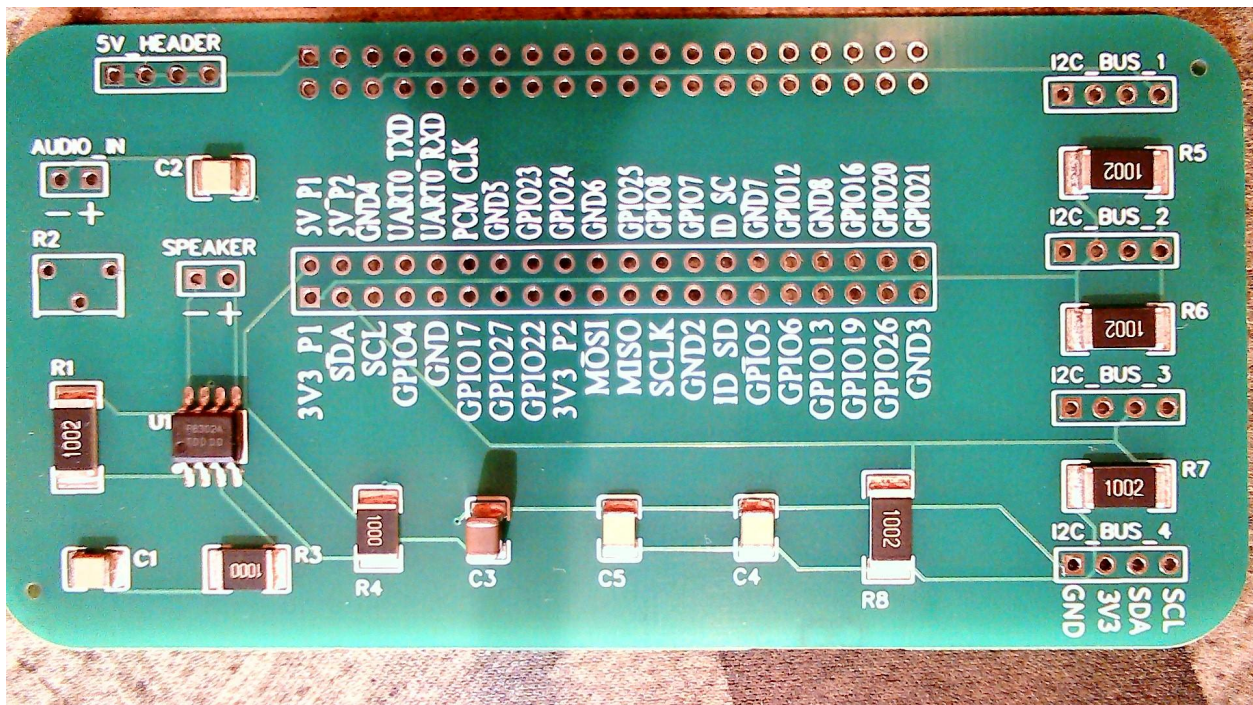


Figure 5: Image of the assembled PCB.

Part Information:

Electronics Part Information						
Quantity	Unit	Reference Designators	Part name	Part Number	Cost	URL to part
1 each		Microprocessor	Raspberry Pi Zero W	3708	\$14.00	https://www.adc
1 each		Digital_Display	128x32 Mini OLED Display	3527	\$14.95	https://www.adc
1 each		Temp_sensor	Contact-less Infrared Scanner	MLX90614	\$15.95	https://www.adc
1 each		Input_sensor	IR Beam Break Sensor	2167	\$1.95	adafruit.com/pir
2 each		AUDIO_IN, SPEAKER	HDR-F-2.54_1x2	C49661	\$0.03	https://csc.com
4 each		C1,C2,C4,C5	100nF	C527375	\$0.12	https://csc.com
1 each		C3	10uF	C380537	\$0.25	https://csc.com
1 each		F_HEADER	HDR-F-2.54_2x20	C50982	\$0.16	https://csc.com
5 each		5V_HEADER, I2C_BUS_1, I2C_BUS_2, I2C_BUS_3, I2C_BUS_4	HDR-F-2.54_1x4	C225501	\$0.09	https://csc.com
1 each		M_HEADER	HDR-M-2.54_2x20	C50980	\$0.12	https://csc.com
5 each		R1, R5, R6, R7, R8	10K	C270956	\$0.03	https://csc.com
1 each		R2	10K	C81167	\$0.32	https://csc.com
2 each		R3,R4	100	C63036	\$0.04	https://csc.com
1 each		U1	PAM8302AADC	C112137	\$0.23	https://csc.com
1 each		JLCPCB	PCB	Y3-3565453A	\$20.00	
1 each		N/A	SAMSUNG EVO Select 64GB microSDXC	MB-ME64HA	\$10.99	http://www.ama
				Subtotal:	\$79.23	
Enclosure Part Information						
Quantity	Size	Part In Assembly	Length	Estimated Cost		
3 M4		Temperature Scanner Mount to Backboard	12-15mm	\$1		
8 M4		Beam Break Sensor Mount to Backboard	13-15mm	\$3		
4 M3		Raspberry Pi Mount to Backboard	10-13mm	\$1		
1 M3		OLED Mount to Backboard	8-10mm	\$1		
4 M4		Speaker Mount to Backboard	25-27mm	\$1		
2 M3		Beam Break Sensor Mount	13-15mm	\$1		
4		Command Strips		\$3		
1 Kg		3D Printer Filament for Enclosure		\$25		
1		1/4" Brass nut		\$4		
				Subtotal:	\$40	
				Total:	\$119	