



MOTIUS
WE R&D.

BOM Analyzer

Motius GmbH
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BOM Analyzer

 Automotive

 Computer Vision

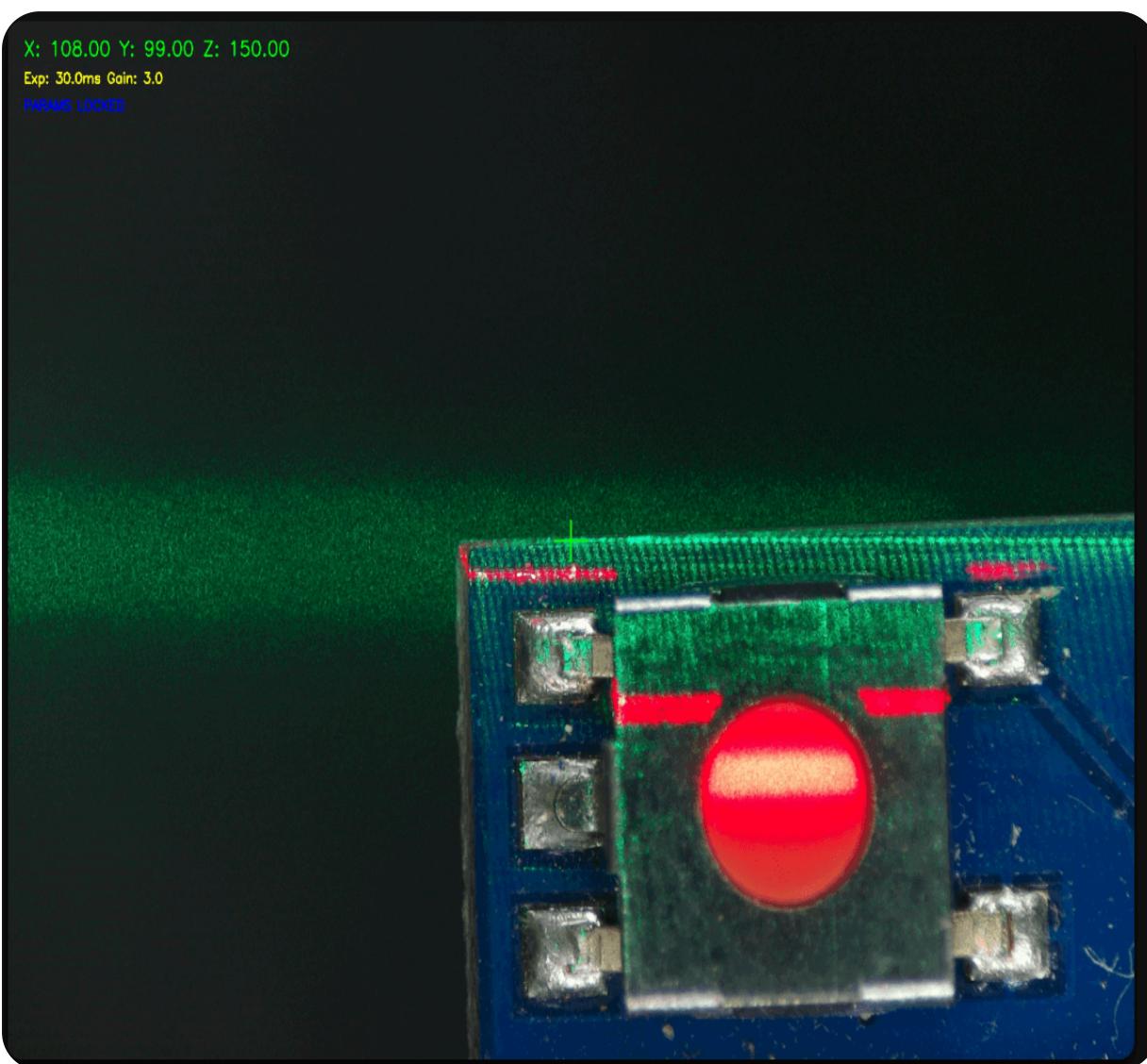
BOM Analyzer is a low-cost reverse engineering tool that takes a series of high-resolution images of a PCB, and even measures the height of components with a line laser that's projected onto the PCB at an angle.

Using a custom computer vision model we achieve 98% accuracy in identifying surface mount components on the PCB. For the remaining 2%, there is a built-in labeling & retraining workflow.

We developed the hardware, control software, classification model, and user interface for this project for an automotive customer **from scratch in only a few weeks**. Motius is now looking for further pilot customers.

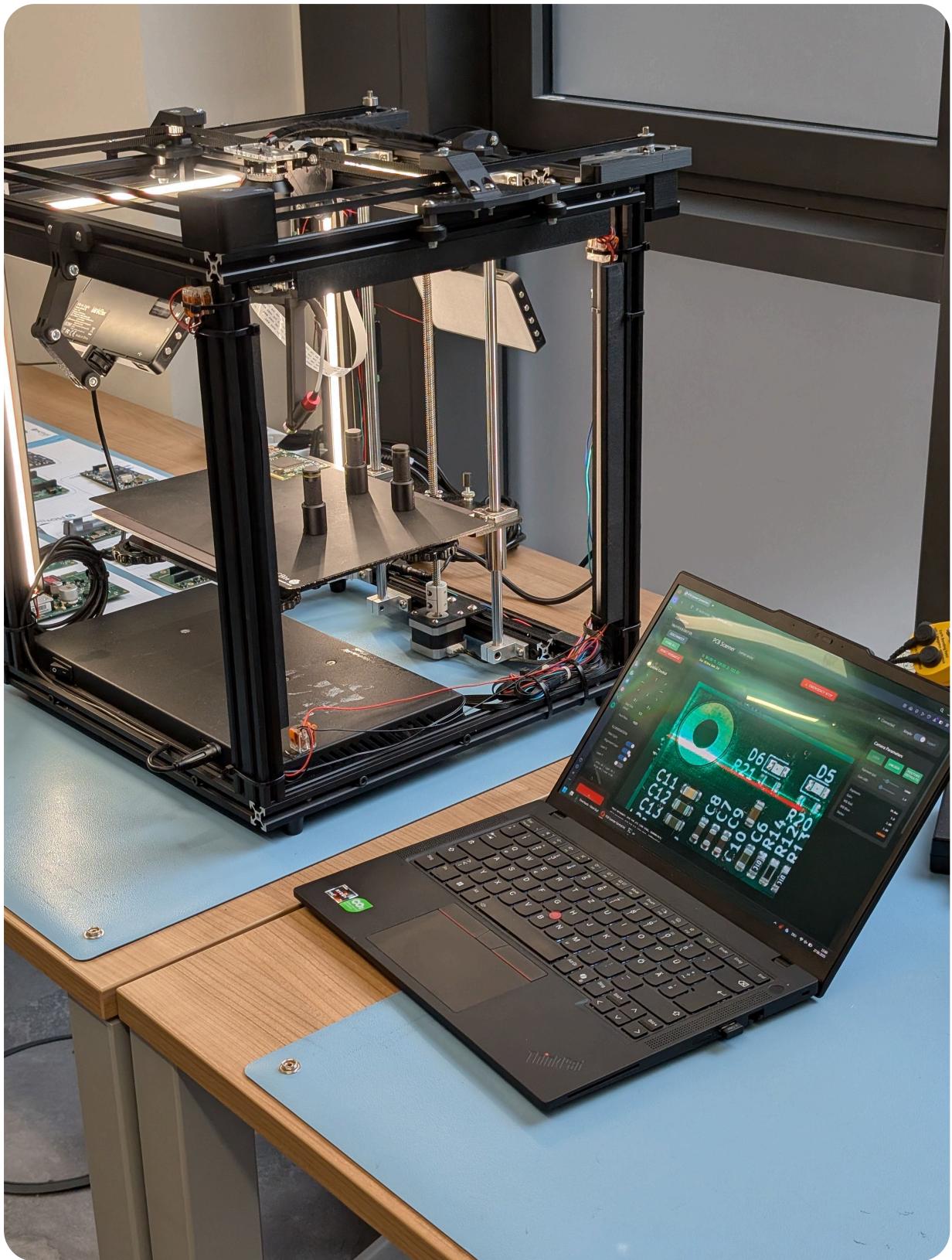
Sensors

The machine uses a single camera to capture close up images of the PCB. Stitching several close-up captures together, avoids tall components occluding parts of the PCB.



One of the red lasers (for height measurement) and green laser (for alignment) turned on. A combination of both are used for the auto focusing the camera

Three lasers are further used for aligning the PCB properly on the scanning bed, for focussing the camera and measuring the height of the components. Two red lasers are used to determine the height of components based on the laser triangulation principle. A combination of both the red and green laser is used for auto-focusing the camera.



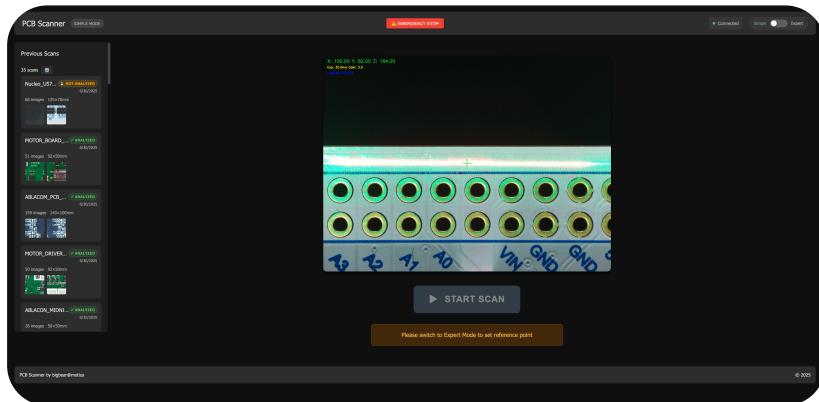
BOM Analyzer is based on a modified CoreXY gantry, image classification can run on an edge device (or in this case on a laptop)

Control Software and User Interface

Our software is easy to use, but still lets experts manually control every aspect of the machine, and dive into every detail of the captured images, classification labels, dimensions, and detected component labels.



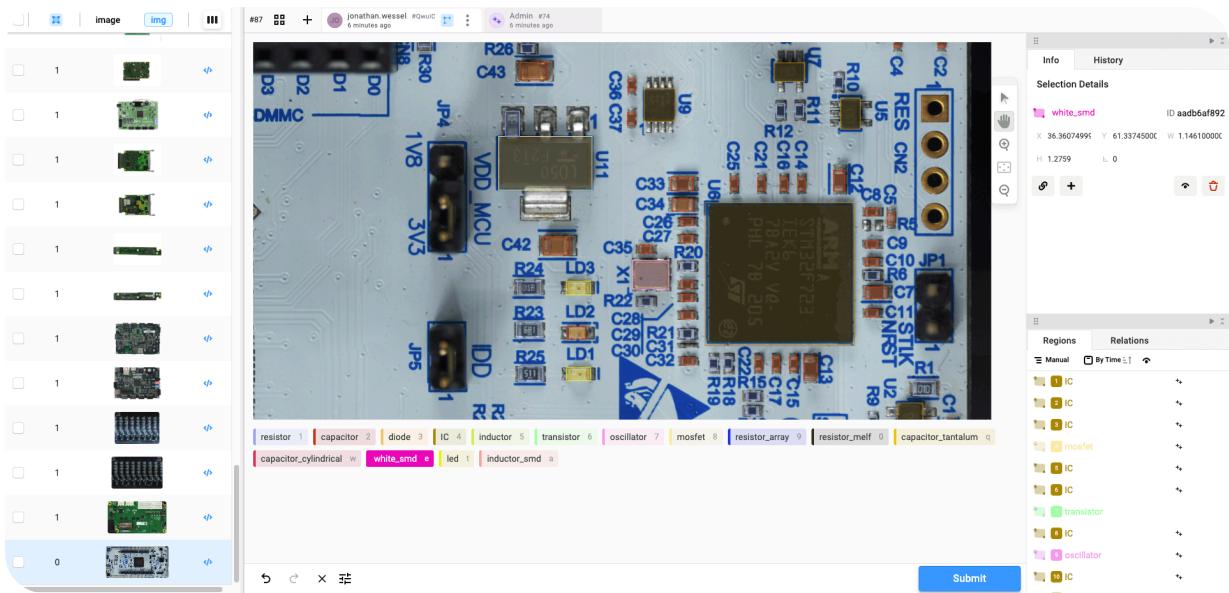
Simple user interface, where the user places and aligns the PCB, before starting the scan



Expert user interface, with more granular controls and options for the scan

Labeling

Our system is based on an open source foundational model that is trained on open data sets, and then further extended with our own training set. Labeling is done using Label Studio.



Label Studio interface for labelling self scanned data

Results

The result of this design is a low-cost machine that can create highly detailed captures of the largest PCBs in minutes, and analyze & label their components in seconds.

Additionally, we put together our own database of >350,000 components that you will also gain full access to.

The screenshot shows the LIGHTWORKS software interface. At the top, it says 'LIGHTWORKS_BACKSIDE_20250618_154828_66x49mm_done'. Below that is a 'PCB Analysis Result' section with a thumbnail of the PCB. The main area is a 'Bill of Materials Summary' table:

Category	Footprint	Quantity	Actions
CAPACITOR	C_1206_3216Metric	1	
CAPACITOR	C_0402_1005Metric	11	
CAPACITOR	C_0603_1608Metric	4	
OSCILLATOR	N/A	1	
RESISTOR	R_0603_1608Metric	26	
DIODE	N/A	1	
IC	N/A	4	
INDUCTOR_SMD	L_0603_1608Metric	1	
RESISTOR	R_0402_1005Metric	14	
Total Components		63	

At the bottom are buttons for 'DOWNLOAD ZIP', 'VIEW RAW IMAGES (36)', 'RE-RUN ANALYSIS', and 'CLOSE'.

Summary output of the scan, here highlighting the 26 detected resistors

SONNENGLAS_PCB_20250618_143436_53x34mm_done

PCB Analysis Result

Summary Edit Detailed BOM

Detailed BOM Table

Detailed Bill of Materials

LOOKUP ALL MPNS EXPORT CSV

#	Category	MPN	Amount	Package	Length (mm)	Width (mm)	Height (mm)	Marking Code	Power	Pins
1	CAPACITOR	C_1206_3216L	3		3.30	1.77		Enter marking code		
2	DIODE		2		2.76	1.87		Enter marking code		
3	IC		1		9.20	4.18		16F19324		
4	IC		1		3.24	1.97		PAB 212		
5	INDUCTOR		1		6.20	5.46		Enter marking code		
6	LED	LED_0603_168...	1		1.66	1.83		Enter marking code		
7	RESISTOR	R_0805_2012M...	18		2.16	1.46		Enter marking code		
8	TRANSISTOR		3		3.13	1.47		Enter marking code		
Total Components			30							

DOWNLOAD ZIP VIEW RAW IMAGES (16) RE-RUN ANALYSIS CLOSE

Detailed BOM of the scan, with marking code detection using OCR. This can be used in combination with the marking code database to find components.