
Soldering Station

Author Ceyhan Yildiz

Content

1	Introduction.....	2
2	Material and methods	3
2.1	Flowchart.....	4
2.2	Observed.....	5
3	Results	5
3.1	Case	6
3.2	PCB.....	7
4	Discussion	8
4.1	First problem	8
4.2	Second problem.....	8
4.3	third problem.....	8
5	Reference list.....	8

1 Introduction

For my project I embarked on building a soldering station based on the blueprint provided by our lecturer (Elektor (ElektorMAG, 2021)). The soldering station I created includes essential features such as a temperature control knob, soldering iron holder and a replaceable tip iron. These components enable precise temperature control during soldering tasks and provide a safe storage solution for the soldering iron.

While I consider my efforts in building the soldering station satisfactory. I do recognize that there is room for improvement. One aspect I identified for enhancement is the addition of a built-in smoke absorber for safety purposes. Implementing such a feature would help mitigate potential health risks associated with soldering fumes.

However, due to financial constraints, I was unable to fully complete the project as envisioned. Despite this limitation. I was able to gain valuable hands-on experience and expand my knowledge in soldering techniques and electronics assembly. Building a functional device from scratch was challenging but ultimately provided me with a deeper understanding of the entire process.

In conclusion, even though I didn't have sufficient funds to fully realize my project. I'm satisfied with the progress I made in constructing the soldering station. I now possess a valuable tool for future DIY (Do It Yourself) projects and have acquired valuable skills and knowledge along the way. Moving forward, I hope to continue improving my soldering station and explore additional projects in the field of electronics.

2 Material and methods

I consider myself quite lucky as one of my college mates made it incredibly easy for me to acquire the necessary components for a mere **35 euros**. This stroke of fortune has paved the way for an exciting project or experiment. Let me introduce you to the components I now possess:

Please note that the following comments can also be found in the ElektorMAG magazine published in 2021 on page 34.

Smd (Surface mount technology)

SOD (Small Outline Diode)

TO (Transistor Outline)

Resistors:

- 18 K Ω smd 805
- 1 M Ω smd 805
- 68 K Ω smd 805
- 5.6 K Ω smd 805
- 10 K Ω smd 805
- 100 Ω smd 805
- 10 M Ω smd 805
- 4.7 K Ω smd 805

Inductors:

- L1 smd 805
- L2 smd 2545

Capacitors:

- 4700 μ F True hole D25xL25mm
- 10 μ F smd D4XL5,4
- 100 nF smd 805
- 100 μ F smd D8xL10mm
- 10 nF smd 805

Semiconductors:

- 1N4007 smd SOD-123FI
- Zener smd SOD-123FI
- 1N14148 smd SOD-123FI
- Bridge smd TTF
- BC847C smd SOT-23
- MOSFET-P smd TO-252-2(DPAK)
- BC857C SOT-23
- DC/DC True hole
- MCP6002-E/MS MSOP-8
- Microcontroller TQFP-48
- Relay True hole
- IC2 7-segment smd SOP-20
- Encoder True hole

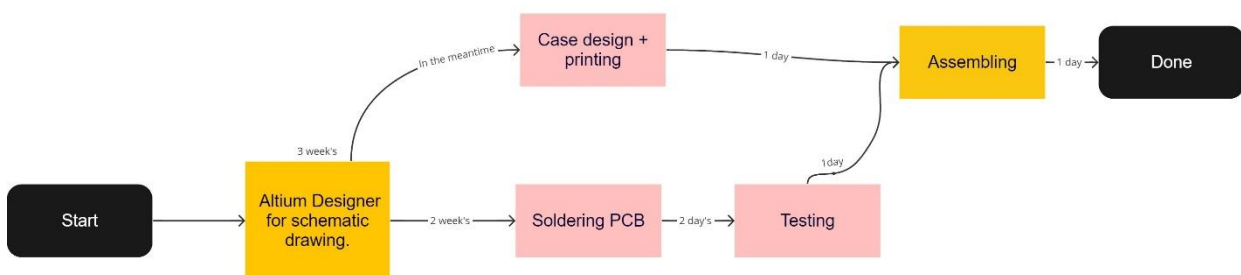
With these components, I can construct the soldering station that meets my specific needs. The resistors will help regulate lower the voltage, and the capacitors and inductors can assist with filtering and power supply stability. The semiconductors, including diodes and transistors, play crucial roles in controlling the heating element and managing the power flow.

The microcontroller will serve as the brain of the soldering station, enabling precise temperature control, user interface, and additional features such as temperature display and adjustable settings. The relay can be used for switching the heating element on and off, while the IC2 7-segment display driver will allow for temperature readout.

Overall, with these components, I have the foundation for building a functional and customized soldering station that will enhance my soldering projects with precise temperature control and additional features.

2.1 Flowchart

Below is a comprehensive flowchart outlining the sequential process for creating a project using Altium Designer. It encompasses the stages of case design and printing, PCB soldering, testing, and project assembly. This streamlined workflow offers a clear, step-by-step guide to ensure a successful project completion.



The process begins with the utilization of Altium Designer. A software tool for schematic drawing which is used for a duration of 3 weeks. During this time the schematic design for the PCB is meticulously created.

After successfully finalizing the schematic design I decided to collaborate with two other individuals who were also working on the same project. By combining our efforts and orders, we were able to leverage the benefits of a group purchase resulting in reduced shipping costs. As a result I only needed to pay 32 euros, significantly reducing the overall expenses.

During the waiting period of approximately two weeks for the PCB fabrication. I made efficient use of my time by focusing on designing and printing a customized case for the project. This approach allowed me to create a personalized case that perfectly matched the project's requirements ensuring both functionality and aesthetics were met. By capitalizing on this waiting period I ensured that every aspect of the project was optimized and met my high standards.

Once the PCB arrives from the manufacturer the next step is soldering. This involves carefully placing and soldering electronic components onto the PCB following the schematic design. Precision and attention to detail are vital during this phase.



Following the soldering process a dedicated 2-day period is allocated for testing the functionality of the assembled PCB. Various tests and inspections are conducted to ensure that the PCB operates as intended and meets the required specifications.

Once the PCB has successfully passed the testing phase the final step is assembling the project. The assembled PCB along with any other necessary components is integrated into the previously printed case.

2.2 Observed

During the construction of my project. I observed that certain students opted for a greater utilization of through-hole components as opposed to SMD's. This strategic decision allowed them to assemble the PCB more effortlessly. In contrast, I encountered difficulties while attempting to incorporate a silkscreen onto my PCB design.

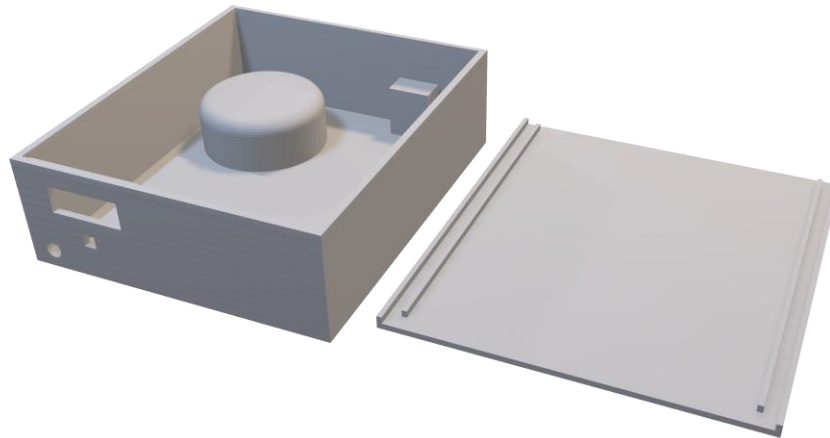
3 Results

Despite facing financial constraints, I managed to make significant progress on the project. I successfully soldered my PCB, demonstrating my skill and attention to detail in electronic circuitry. By meticulously assembling and connecting the components, I ensured the functionality and reliability of the PCB.

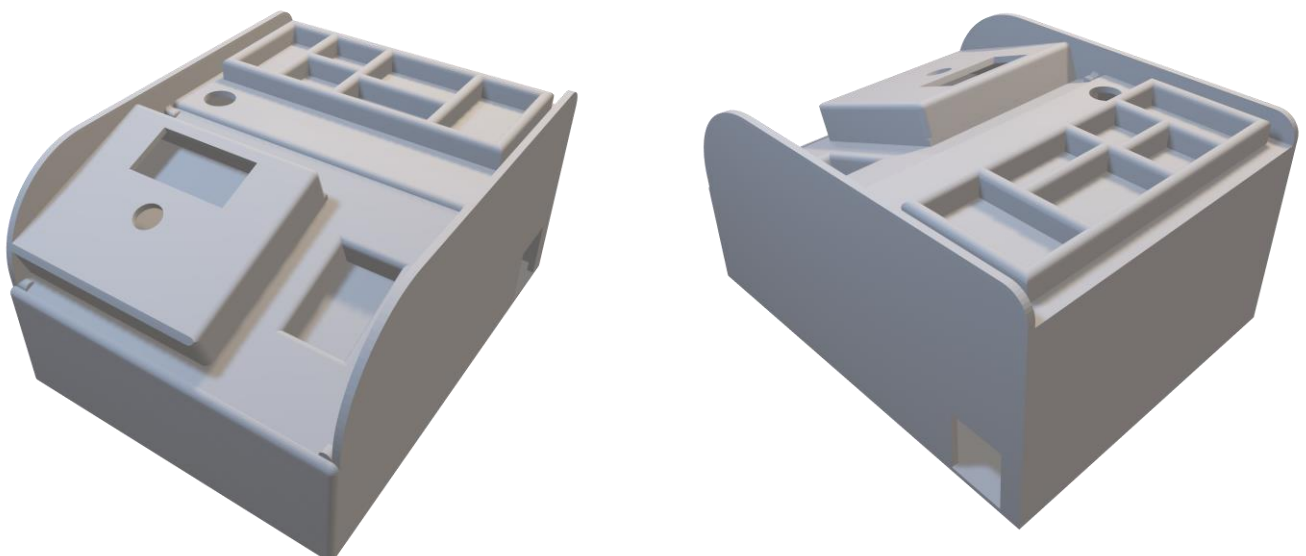
Regarding the 3D design, although I couldn't afford to print it, I dedicated my efforts to carefully drawing and refining the design. Paying attention to intricate details, I aimed to create an accurate representation of the envisioned object or prototype. While the physical manifestation was limited by financial circumstances, my commitment to the project is evident through the meticulous and thorough work put into the 3D design.

3.1 Case

During the course of my project, there came a pivotal moment when I confronted a disheartening realization: my existing design fell short of my lofty expectations. Rather than succumbing to discouragement, I chose to embrace the challenge head-on, harnessing my unwavering determination to create a remarkably enhanced 3D design. Refusing to be deterred by self-doubt, I swiftly crafted a brand-new case design, propelling myself beyond my previous endeavors and embarking on a relentless pursuit of an ideal outcome.



With utmost ingenuity I meticulously crafted the case to embody unparalleled user-friendliness. Placing convenience and functionality at the forefront of its design. To elevate its usability I integrated supplementary storage compartments atop the case enabling you to impeccably arrange and safeguard your treasured keepsakes. Moreover I attentively incorporated a compact holder specifically tailored to securely accommodate a sponge Providing you with effortless access to maintain the cleanliness of your soldering tip whenever the need arises. Through the implementation of these considerate features my intention was to guarantee a seamless and gratifying user experience for anyone utilizing the case.



3.2 PCB

I am genuinely overjoyed with the final result of the PCB design. The meticulous attention to detail and careful consideration of every aspect have culminated in a truly remarkable outcome. One aspect that brings me immense satisfaction is the choice of color. The selected color not only adds a touch of elegance but also enhances the overall visual appeal of the board. Its subtle yet distinct presence exudes a sense of professionalism and sophistication elevating the board to a new level of aesthetic excellence. It brings me great pleasure to see that the design meets and even surpasses my expectations, a testament to the dedication and effort invested in this project. I am confident that this exceptional visual appeal will captivate the attention of anyone who encounters the PCB leaving a lasting impression of quality and craftsmanship.



4 Discussion

4.1 First problem

Upon receiving my PCB from the manufacturer I encountered a few challenges that demanded my attention. One of the components specifically IC2 7-segment did not align correctly with its designated footprint. Regrettably the component was slightly oversized posing a significant obstacle. However I was fortunate to have the option of carefully bending the pins of the IC in order to solder it on top. Balancing precision with caution I had to exercise great care to avoid exerting excessive force that might result in damaging or breaking the pins.

4.2 Second problem

The learning curve for Altium Designer was undeniably steep requiring a significant investment of my time and effort. Over the course of three weeks I dedicated myself to mastering its intricacies. Despite the initial challenges I persevered and successfully acquired the necessary skills to navigate and utilize this powerful tool effectively. Looking ahead I am eager to employ Altium Designer to its fullest potential in my future projects. Its robust capabilities make it an invaluable asset and it would be a missed opportunity not to leverage its full range of features.

4.3 third problem

Initially I was unprepared for the substantial expenses associated with my project. I had hoped that the costs would be within the range of approximately 100 euros based on the information I had gathered. However upon observing that over 90% of students are spending upwards of 150 euros. It became apparent that a higher investment correlated with a greater likelihood of success. This realization emphasized the importance of allocating sufficient funds to increase my chances of achieving the desired outcome. While the unexpected cost may have caught me off guard. I now understand the significance of investing more in order to maximize my potential for success.

5 Reference list

Elektor Mag 507 MAY/JUNE 2021

ELEKTORMAGAZINE.COM