**Design Soldering station**

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# Introduction

In this project, a soldering station is built. The station features a variable temperature system with a modular soldering iron. The main reason for this project is to learn how to use Altium designer and to realize a practical device to be used in further projects. This application note will include the entire process of the design under which the materials and methods, the results and a discission. The starting point for the project is an electric magazine in which the electrical schematics are covered, also the magazine has a lot of the necessary information required to make the best component choices.

# Material and methods

The most important design tools that are utilized in this project are Altium Designer and Autodesk Inventor. Altium Designer is used to design the electrical schematics and the PCB. Autodesk Inventor is used to design the enclosure and holder for the iron. This part is 3D printed and is intended to hold all of the electronics. The Iron holder is designed to hold the hot soldering tip so is made out of a combination of iron and 3D printed parts. The electronical components that are prescribed by the electronics magazine Elektor are mainly ordered from Mouser, but because of stock issues and long delivery times, some components had to be ordered from different websites like for example Wurth Elektronik, TME and Conrad.

|  |  |  |
| --- | --- | --- |
| Description | Quantity | ordered from |
| Connector | 5 | WE |
| Bridge Rectifier | 2 | Mouser |
| Capacitor Polarised 50V 4700µF | 1 | WE |
| Capacitor Polarised 50VDC 10µF | 4 | WE |
| Capacitor 0.1 µF 50VDC, Capacitor 100 µF 50VDC | 7 | WE |
| Capacitor 0.01µF 50VDC | 7 | WE |
| Diode | 1 | Mouser |
| Diode | 1 | Mouser |
| Integrated Circuit | 1 | Mouser |
| Integrated Circuit, opamp | 1 | Mouser |
| Integrated Circuit | 1 | TME |
| LED Drive Control Special Circuit | 1 | Not yet ordered |
| Connector | 3 | Mouser |
| Connector | 1 | Mouser |
| Connector | 1 | Mouser |
| Connector | 1 | Mouser |
| Connector | 2 | Mouser |
| RELAY GEN PURPOSE DPDT 8A 115V | 1 | Not yet ordered |
| SMD Inductors 10uH ±20% 0.9A 0.1729Ω 1210 | 1 | Mouser |
| Transformer | 1 | Mouser |
| Display | 1 | Mouser |
| Transistor BJT NPN | 3 | Mouser |
| MOSFET (P-Channel) | 1 | Mouser |
| Transistor BJT PNP | 1 | Mouser |
| Resistor 18KOhm | 3 | Available in school |
| Resistor 10KOhm | 7 | Available in school |
| Resistor 1MOhm | 1 | Available in school |
| Resistor 10MOhm | 1 | Available in school |
| Resistor 5.6KOhm | 4 | Available in school |
| Resistor 510Ohm, Resistor 100Ohm | 3 | Available in school |
| Resistor 4.7KOhm | 6 | Available in school |
| Undefined or Miscellaneous | 1 | Mouser |
| Zener Diode | 1 | Mouser |

In the list above all of the components for the PCB are displayed alongside the part name, the quantity and where they are ordered. In order to choose the right components to buy, all of them have to be easily available for Altium Designer so there cannot be any mistakes in the electrical schematics. Some components however are not available with a predefined footprint, the Altium Library loader tool is a way to import third-party footprints into the project so they are also implemented correctly. Also, they have to be in stock and can be delivered quickly. The last and most important factor in choosing the component is the price since the entire product is meant to be as cheap as possible.

The entire process starts with the schematic design. This is done in Altium designer as mentioned above. All of the schematics are recreated out of the Elektor magazine. When the schematic design is finished the next step is to design the Printed Circuit Board which also is done using Altium Designer. The PCB design uses the footprints of the components and lays them out on a PCB, this process is done very carefully because the components all have a specific height and width so they must be placed right. Also to make the repairability better the components are placed in groups to better match the schematic that is made in the previous step. Alongside this PCB design, the components are selected to match the specifications of the project. These specifications are found in all of the datasheets that are available on the internet. After the PCB design step is complete the enclosure will be designed, its purpose is to hold the PCB and accessories of the project so it must be made specifically for this project. The entire enclosure will be 3D printed because it is an inexpensive way to fabricate a complex design. Once all of the components are made the assembly and testing is the next and final step. In this step, the PCB is assembled by soldering the electronics onto the board. After that it will be put into the enclosure and tested to make sure everything functions properly. After all of these steps, the soldering iron is able to function as intended.

# Results

[Describe the end result you accomplished.

* Describe every aspect of your device. How does it function?
* Add an image of the electrical schematic, PCB design, finalized mechanical design, and finalized product

Write a well-structured text using subtitles and paragraphs.

**+/-500**]

## Subtitle 1

### Subtitle

### Subtitle

## Subtitle 2

### Subtitle

### Subtitle

# Discussion

[Reflect on and discuss your project.

* Which difficulties did you encounter during the design process and why? How did you solve these issues?
* Reflect on the process: did things go as expected? Would you choose the same approach if you had to do the project all over again? Are there issues that still need to be fixed? How come?

**+/-300 words**]

# Reference list

[Insert your reference list here.]