**1. Vorschau**

This tutorial explains how to build your own chest that is secured with code. In addition, you will learn a bit about the Python programming language.

**You will learn...**

* ...retrieve data from a keypad.
* ...to set up a small computer.
* ...switching circuits with a relay.
* ...to control an LED.
* ...and many other things.

**What functions does the LockSafe chest have?**

* You can think of your own 6-digit code.
* When entering incorrectly too often, lock the chest for 60 seconds.
* Locking your secrets in the chest
* and many more functions...

**2. Material**

I have created a list of products that we need here.

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| You may already own a product. Therefore, only buy what you need. |

* [Raspberry Pico](https://www.reichelt.de/raspberry-pi-pico-rp2040-cortex-m0-microusb-header-rasp-pi-pico-h-p305824.html?&trstct=vrt_pdn&nbc=1) => IMPORTANT: Order with pin headers
* [12v Stecker with USB and DC](https://www.amazon.de/Zolt-Universal-USB-Anschluss-DC-Stecker-Haushaltselektronik/dp/B0932YBT9X/ref=asc_df_B0932YBT9X/?tag=googshopde-21&linkCode=df0&hvadid=546566796845&hvpos=&hvnetw=g&hvrand=10075993509748832043&hvpone=&hvptwo=&hvqmt=&hvdev=c&hvdvcmdl=&hvlocint=&hvlocphy=9042442&hvtargid=pla-1428434119420&psc=1&th=1&psc=1) plug
* [MicroUSB cable](https://www.amazon.de/EMOS-micro-USB-Schnellladekabel-Schnelladen-Datenübertragung-weiß/dp/B0B8NGY6MM/ref=sr_1_3?keywords=Micro-USB+Kabel&qid=1683725027&sr=8-3)
* [Keypad 3x4](https://www.reichelt.de/entwicklerboards-folientastatur-4-x-3-ziffern-debo-tast-4x3-p224223.html?&trstct=vrt_pdn&nbc=1)
* [Connecting cable](https://www.amazon.de/Female-Female-Male-Female-Male-Male-Steckbr%C3%BCcken-Drahtbr%C3%BCcken-bunt/dp/B01EV70C78/ref=asc_df_B01EV70C78/?tag=googshopde-21&linkCode=df0&hvadid=310491639325&hvpos=&hvnetw=g&hvrand=11461513820173354466&hvpone=&hvptwo=&hvqmt=&hvdev=c&hvdvcmdl=&hvlocint=&hvlocphy=9042442&hvtargid=pla-362913641420&psc=1&th=1&psc=1&tag=&ref=&adgrpid=59900935617&hvpone=&hvptwo=&hvadid=310491639325&hvpos=&hvnetw=g&hvrand=11461513820173354466&hvqmt=&hvdev=c&hvdvcmdl=&hvlocint=&hvlocphy=9042442&hvtargid=pla-362913641420)
* [Breadboard](https://www.kaufland.de/product/429289378/?kwd&source=pla&sid=41790452&gclid=Cj0KCQiAnNacBhDvARIsABnDa6-gY4RCjDM2pLt6dpFGdofF5kMT8Iouvvrn-3orQxaCjP3QdQzAJzkaAtBCEALw_wcB)
* Wooden box with flat lid
* [Relay](https://www.reichelt.de/entwicklerboards-relais-modul-5-v-srd-05vdc-sl-c-debo-relay-5v-p239148.html?CCOUNTRY=445&LANGUAGE=de&&r=1)
* [Lock](https://www.amazon.de/gp/product/B01N650528/ref=ppx_yo_dt_b_asin_title_o07_s00?ie=UTF8&psc=1)

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| You only need to buy the following products if you want to use an LED: |

* [220 Ohm Resistor](https://www.amazon.de/Metallfilm-Fest-Durchgangsloch-widerst%C3%A4nde-Strombegrenzung-Rohs-zertifiziert/dp/B08QRXLKZQ/ref=sr_1_3_sspa?keywords=220+Ohm+Widerstand&qid=1670753216&sr=8-3-spons&sp_csd=d2lkZ2V0TmFtZT1zcF9hdGY&psc=1)
* [LED](https://www.reichelt.de/led-5-mm-bedrahtet-gruen-110-mcd-22--led-5mm-gn-p10232.html?PROVID=2788&gclid=Cj0KCQiAnNacBhDvARIsABnDa691HgcaGFhhWA0Ui6jMinj2Y0J1jq9og1Tg4IVw1qHuxhXOjJP_KiIaAjaOEALw_wcB)

**3. set up Pico and Thonny**

**3.1 Connecting Pico to the PC**

First you have to install the software on the Raspberry Pico. Since Python is too big, we use Circuitpython. Press and hold the Bootsel button (located on the Pico's board) and connect the Pico to your PC with the MicroUSB charging cable. Do not release the button until the Pico is displayed on your PC. (like a USB stick)

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| Do not open any files or perform any installations! |

**3.2 Load Pico Software**

Now visit[this](https://circuitpython.org/board/raspberry_pi_pico/) website and download the file. When the download is complete, place the file on the Raspberry Pico. The Raspberry Pico will then eject automatically and will no longer be displayed. Unplug the Pico and plug it back in. It should then have the name Circuitpython.

**3.3 Thonny**

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Automatisch generierte BeschreibungVisit [this](https://thonny.org/) page now and download the programme. Execute the file and open it. If the console does not say that the device was found, click on Run -> Configure the interpreter -> Type: CircuitPython (generic) from the menu.

**3. Assemble**

**3.1 Installing the Pico in the box**

First plug the pico into the breadboard ------>

Glue the breadboard (marked green) with the

MicroUSB connector (marked red) down

into the box:

Also cut a Hole for the cable. (marked blue)

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Automatisch generierte Beschreibung

**3.2 Keypad**

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Automatisch generierte BeschreibungEin Bild, das Text, Tisch enthält.

Automatisch generierte BeschreibungTape the keypad to the front of the box and again cut a hole for these cables

behind the keypad.

Now plug in the keypad:

**3.3 Relays and Lock**

Install:

1. hole in the front of the box where the motor

clicks into place

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Automatisch generierte Beschreibung**2. screw the motor to the ceiling in the direction of the front.

3. stick the relay next to the pico

Connect:

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Automatisch generierte Beschreibung**

**3.4 LEDs**

Can be skipped

Install:

**4. Final Code**

Download the Code [**on this Website**](https://github.com/ModeratorPS/build-locksafe/archive/refs/heads/main.zip)!

**Using the code:**   
1. put the files in the folder on your Raspberry Pico (NOT the folder) 2  
2. test everything (open the Python files in the Test folder and see if the function works)  
3. rename one of the 4 files in the root directory to **main.py**=> this file will be executed  
when plugged in  
4. find your file here in the list and execute the instructions for it:

**-- english\_final\_with\_led.py --**

Add your code at the fields where it says your\_1-6\_number (line 46 and 51 in Thonny)  
Now save the Python code with the name main.py. (With this name, the code will be executed automatically when you plug it in.)

You can now unplug the USB plug from your PC and plug it into the USB plug of the 12v power supply.

Now you can unlock your chest...

... \_ \_ \_ \_ \_ \_ #   
Enter your 6-digit code and press "#"  
press "\*" to lock again  
If you enter the code incorrectly 3 times, the chest is locked for 60 seconds!

**-- english\_final\_without\_led.py --**

Add your code at the fields where it says your\_1-6\_number (line 36 and 38 in Thonny)  
Now save the Python code with the name main.py. (With this name, the code will be executed automatically when you plug it in.)

You can now unplug the USB plug from your PC and plug it into the USB plug of the 12v power supply.

Now you can unlock your chest...

... \_ \_ \_ \_ \_ \_ #  
enter your 6-digit code and press "#". ... press "\*" to lock again.