

Python programmieren



mit und ohne Drohnen

Kerstin Reese



Warum Python?



Was ist Python? Welche Vorteile bietet Python?

- Interpretierte Skriptsprache
 - -> schnelle Entwicklungszyklen
- Wenige Sonderzeichen wie Klammern, Semikolon etc.
 - -> weniger Syntaxfehler
- Einrückung ist wichtig
 - -> leicht zu lesen

Das „Zen of Python“

→ Schön ist besser als hässlich.

→ Explizit ist besser als implizit.

→ Einfach ist besser als komplex.

→ Lesbarkeit zählt.

→ Fehler sollten niemals leise auftreten.

→ Es sollte eine – und am besten nur eine – naheliegende Weise geben, etwas zu tun.

→ Wenn die Implementierung schwer zu erklären ist, ist es eine schlechte Idee.

→ Wenn die Implementierung einfach zu erklären ist, kann es eine gute Idee sein.

WHICH PROGRAMMING LANGUAGE SHOULD I LEARN FIRST?

WHAT IS PROGRAMMING?

Writing very specific instructions to a very dumb, yet obedient machine.



LANGUAGES



PYTHON



JAVA



C



PHP



C++



JAVASCRIPT



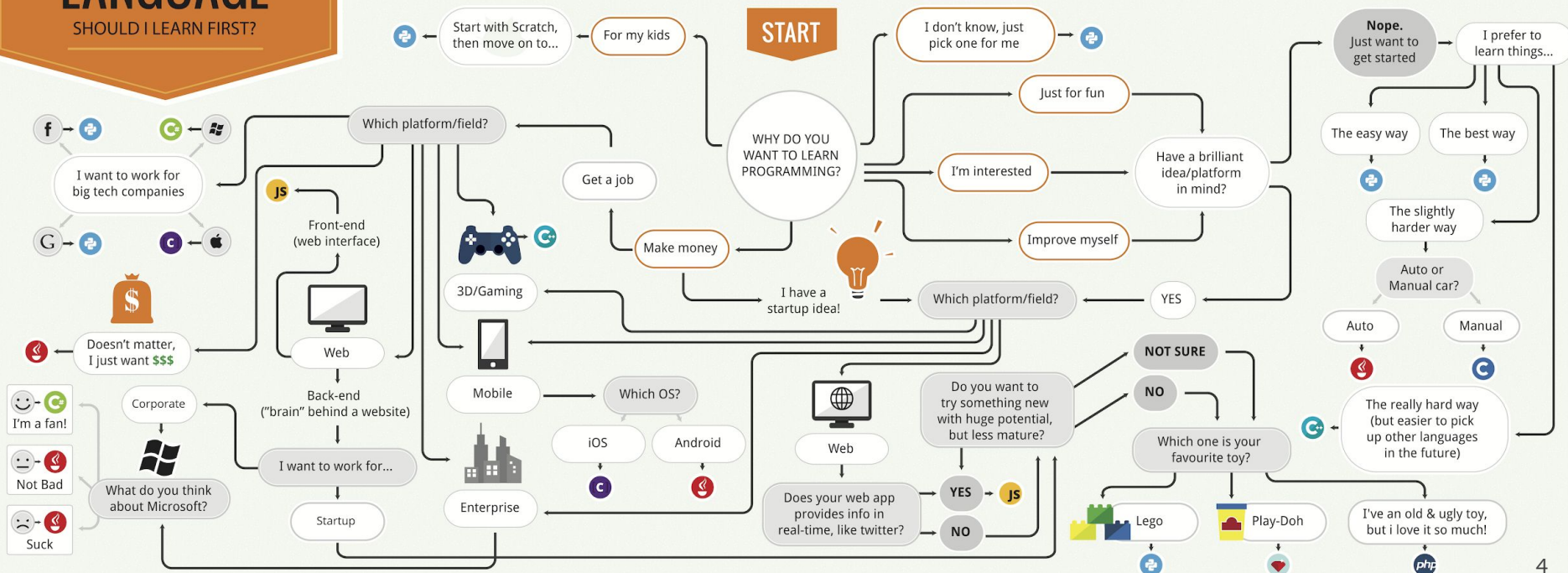
C#



RUBY



OBJECTIVE-C





Python

The Ent

DIFFICULTY
★☆☆☆☆



Help little Hobbits (beginners) to understand programming concepts

Help Wizards (computer scientists) to conduct researches

Widely regarded as the best programming language for beginners

Easiest to learn

Widely used in scientific, technical & academic field, i.e. Artificial Intelligence

You can build website using Django, a popular Python web framework

POPULARITY
★★★★★
USED TO BUILD
YouTube, Instagram, Spotify

AVG. SALARY
\$107,000



THE LORD OF THE RINGS ANALOGY TO PROGRAMMING LANGUAGES

Java Gandalf	C One Ring	C++ Saruman	JavaScript Hobbit	C# Elf	Ruby Man (Middle Earth)	PHP Orc	Objective-C Smaug
DIFFICULTY ★★★★★	DIFFICULTY ★★★★★	DIFFICULTY ★★★★★	DIFFICULTY ★★★★★	DIFFICULTY ★★★★★	DIFFICULTY ★★★★★	DIFFICULTY ★★★★★	DIFFICULTY ★★★★★
<i>Wants peace & works with everyone (portable)</i>	<i>The power of C is known to them all</i>	<i>Everyone thinks that he is the good guy</i>	<i>Frequently underestimated (powerful)</i>	<i>Beautiful creature (language), used to stay in their land, Rivendell (Microsoft Platform), but recently started to open up to their neighbours (open source)</i>	<i>Very emotional creature</i>	<i>Ugly guy (language) and doesn't respect the rules (inconsistent and unpredictable)</i>	<i>Lonely and loves gold</i>
Very popular on all platforms, OS, and devices due to its portability	Everyone wants to get its Power	But once you get to know him, you will realize he wants the power, not good deeds	Well-known for the slow, gentle life of the Shire (web browsers)	Beautiful creature (language), used to stay in their land, Rivendell (Microsoft Platform), but recently started to open up to their neighbours (open source)	They (some Ruby developers) feel they are superior & need to rule the Middle Earth	Big headache to those (developers) to manage them (codes)	Primary language used by Apple for Mac OS X & iOS
One of the most in demand & highest paying programming languages	Lingua franca of programming language	Complex version of C with a lot more features	"Java and Javascript are similar like Car and Carpet are similar" - Greg Hewgill	A popular choice for enterprise to create websites and Windows application using .NET framework	Mostly known for its popular web framework, Ruby on Rails	Yes still dominates the Middle-earth (most popular web scripting language)	Choose this if you want to focus on developing iOS or OS X apps only
Slogan: write once, work everywhere	One of the oldest and most widely used language in the world	Widely used for developing games, industrial and performance-critical applications	A must learn for front-end web developer (HTML and CSS as well)	Can be used to build website with ASP.NET, a web framework from Microsoft	Focuses on getting things done	Suitable for building small and simple sites within a short time frame	Consider to learn Swift (newly introduced by Apple in 2014) as your next language
	Popular language for system and hardware programming	Learning C++ is like learning how to manufacture, assemble, and drive a car	Most popular clients-side web scripting language	Similar to Java in basic syntax and some features	Designed for fun and productive coding	Supported by almost every web hosting services with lower price	
	A subset of C++ except the little details	Recommended only if you have a mentor to guide you	One of the hottest programming language now, due to its increasing popularity as server-side language (node.js)		Best for fun and personal projects, startups, and rapid development		
POPULARITY ★★★★★	POPULARITY ★★★★★	POPULARITY ★★★★★	POPULARITY ★★★★★	POPULARITY ★★★★★	POPULARITY ★★★★★	POPULARITY ★★★★★	POPULARITY ★★★★★
USED TO BUILD Gmail, Minecraft, Most Android Apps, Enterprise applications	USED TO BUILD Operating systems and hardware	USED TO BUILD Operating systems, hardware, and browsers	USED TO BUILD Paypal, front-end of majority websites	USED TO BUILD Enterprise and Windows applications	USED TO BUILD Hulu, Groupon, Slideshare	USED TO BUILD Wordpress, Wikipedia, Flickr	USED TO BUILD Most iOS Apps and part of Mac OS X
AVG. SALARY \$102,000	AVG. SALARY \$102,000	AVG. SALARY \$104,000	AVG. SALARY \$99,000	AVG. SALARY \$94,000	AVG. SALARY \$107,000	AVG. SALARY \$89,000	AVG. SALARY \$107,000

Wo ist Python in der Oberstufe?

Lehrplan

Informatik

Gymnasiale Oberstufe

Grundkurs

Hauptphase

– Erprobungsphase –

2019

Lehrplan

Informatik

Gymnasiale Oberstufe

Leistungskurs

Hauptphase

– Erprobungsphase –

2019

Zugelassene Programmiersprachen sind DELPHI, JAVA und PYTHON.

Gymnasiale Oberstufe Saar (GOS)

Allgemeine Prüfungsanforderungen für das Abitur

im Fach

Informatik

(APA Informatik)

2019

Aufgaben zur Implementierung sollen in den Programmiersprachen Delphi, Java und Python mit gleichem Aufwand bearbeitet werden können.

Welche Python Version soll ich benutzen?

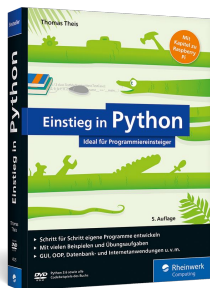
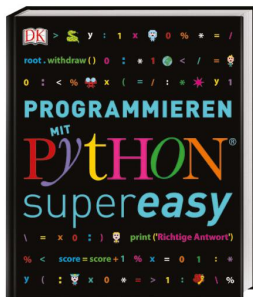
- Python 3 gibt es seit 2008
- Python 2 gab es parallel bis Ende 2019.
Es wird nicht mehr weiterentwickelt.
- Aktuelle Version Dezember 2019: Python 3.8.1
- -> Python 3 sollte gelernt werden!
- www.python.org

Python lernen



Wo kann ich Python lernen?

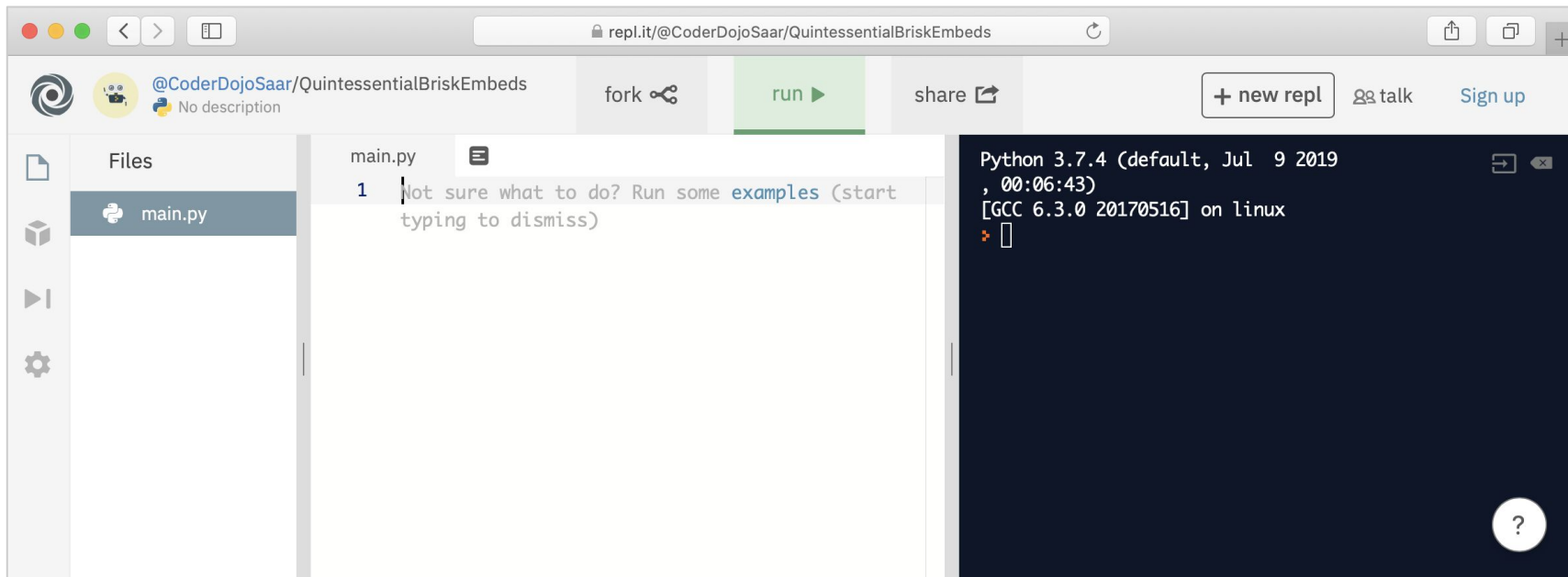
- Viele Tutorials auf Englisch:
 - wiki.python.org/moin/BeginnersGuide
 - www.w3schools.com/python/
 - projects.raspberrypi.org/de-DE/projects?software%5B%5D=python
- Einige Tutorials auf Deutsch:
 - cscircles.cemc.uwaterloo.ca/de/
 - py-tutorial-de.readthedocs.io/de/python-3.3/
 - www.python-kurs.eu/python3_kurs.php
 - www.swisseduc.ch/informatik/karatojava/pythonkara/
 - www.tigerjython.ch
- Videos auf YouTube
- Bücher



Wo kann ich Python online programmieren?



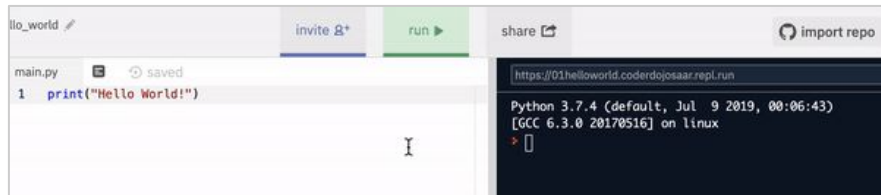
Es gibt verschiedene Webseiten, auf denen man Python programmieren kann, z.B. repl.it



01 - "Hello World!"

```
main.py  saved
1 print("Hello World!")
```

repl.it/@CoderDojoSaar/01helloworld



The screenshot shows a Repl.it workspace titled 'llo_world'. It features a code editor with a file named 'main.py' containing the code `print("Hello World!")`. To the right of the editor is a terminal window showing the output of the code: `Python 3.7.4 (default, Jul 9 2019, 00:06:43) [GCC 6.3.0 20170516] on linux` followed by a prompt `>` and a cursor. Above the code editor are buttons for 'invite', 'run', 'share', and 'import repo'.

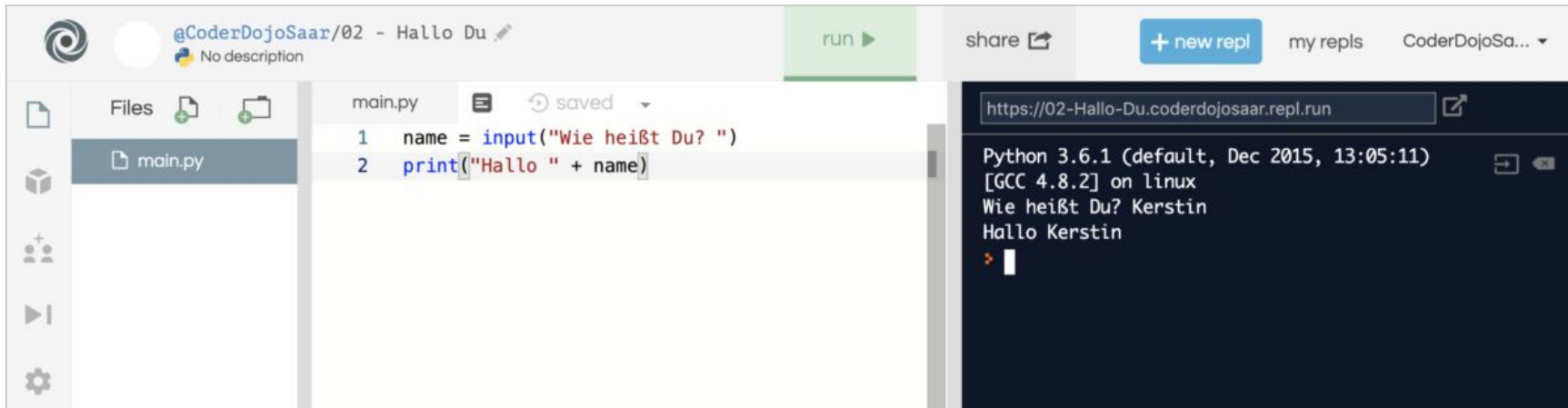
Eingebettet in eine Webseite:



The screenshot shows a web browser window displaying the Repl.it interface. The code editor shows the same `print("Hello World!")` code. The terminal window shows the same output as the previous screenshot. The browser's address bar shows the URL `https://01-Hallo-Welt.coderdojosaar.repl.run`.

info-ag.coderdojo-saar.de/hallo-welt/

02 - "Hallo ..."

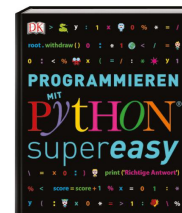


The screenshot shows a web-based Python IDE interface. At the top, the title bar reads "@CoderDojoSaar/02 - Hallo Du" with a "run" button and a "share" link. Below the title bar, there's a "Files" panel on the left showing a file named "main.py". The main editor area displays the following Python code:

```
1 name = input("Wie heißt Du? ")
2 print("Hallo " + name)
```

On the right side, there's a terminal window showing the output of the program. It indicates the Python version (3.6.1) and the environment (GCC 4.8.2 on linux). The input "Wie heißt Du? Kerstin" is shown, followed by the output "Hallo Kerstin".

repl.it/@CoderDojoSaar/02-Hallo-Du



03 - “Hallo Welt!”



The screenshot shows a web-based code editor interface. At the top, the title is "@CoderDojoSaar/01 - Hallo Welt!-1" with a "run" button. Below the title, there's a "Files" sidebar on the left showing a file named "main.py". The main editor area displays the following Python code:

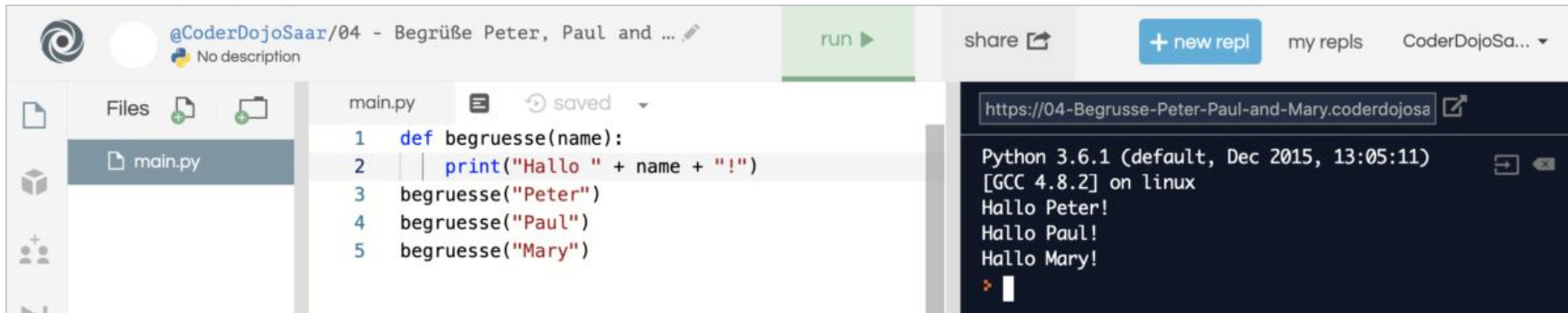
```
1 def begruesse_die_welt():  
2     print("Hallo Welt!")  
3 begruesse_die_welt()
```

On the right side, there's a "share" button and a "new repl" button. Below these, a URL is shown: <https://01-Hallo-Welt-1.coderdojosaar.repl.run>. The output area on the right shows the execution results:

```
Python 3.6.1 (default, Dec 2015, 13:05:11)  
[GCC 4.8.2] on linux  
Hallo Welt!  
➤
```

repl.it/@CoderDojoSaar/03-Begruesse-die-Welt

04 - Begrüße Peter, Paul und Mary!



The screenshot shows a web-based code editor interface. At the top, the title is "@CoderDojoSaar/04 - Begrüße Peter, Paul and ...". Below the title, there's a "run" button and a "share" button. The main area is divided into two parts: a file explorer on the left showing "main.py" and a code editor on the right. The code editor contains the following Python code:

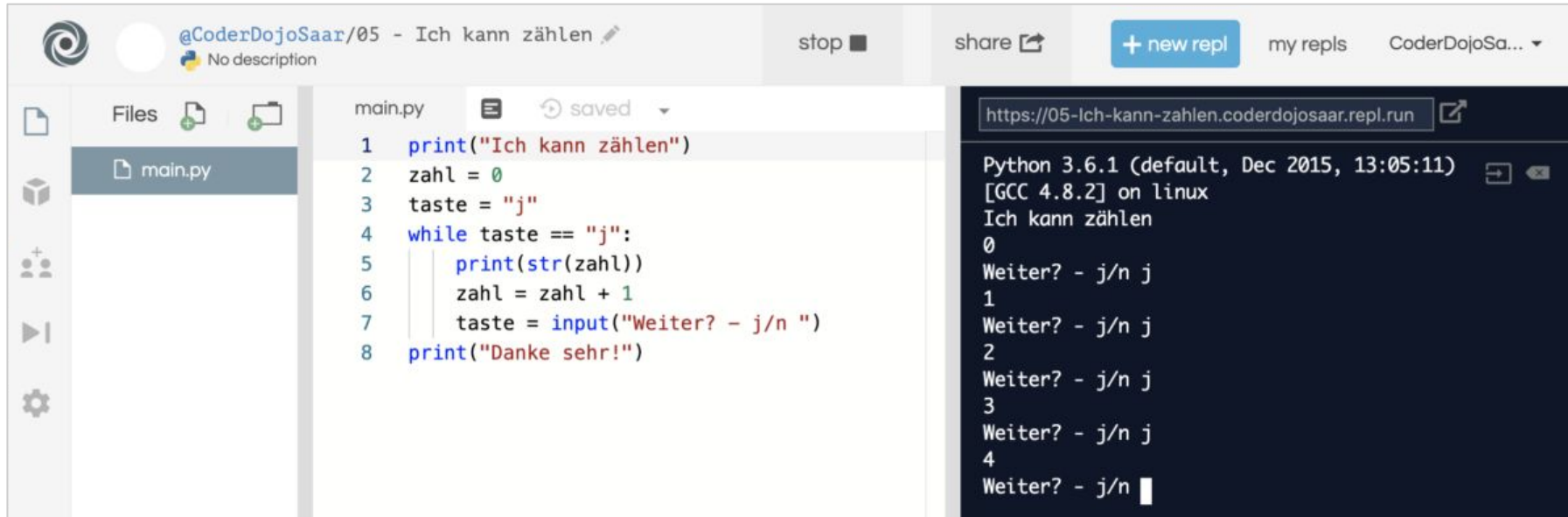
```
1 def begruesse(name):
2     print("Hallo " + name + "!")
3 begruesse("Peter")
4 begruesse("Paul")
5 begruesse("Mary")
```

Below the code editor, there's a terminal window showing the output of the script:

```
Python 3.6.1 (default, Dec 2015, 13:05:11)
[GCC 4.8.2] on linux
Hallo Peter!
Hallo Paul!
Hallo Mary!
```

repl.it/@CoderDojoSaar/04-Begrusse-Peter-Paul-and-Mary

05 - Ich kann zählen



The screenshot shows a Repl.it code editor interface. The top bar displays the username '@CoderDojoSaar' and the repository name '05 - Ich kann zählen'. The left sidebar shows a file explorer with 'main.py' selected. The main editor area contains the following Python code:

```

1 print("Ich kann zählen")
2 zahl = 0
3 taste = "j"
4 while taste == "j":
5     print(str(zahl))
6     zahl = zahl + 1
7     taste = input("Weiter? - j/n ")
8 print("Danke sehr!")
  
```

The right sidebar shows the terminal output of the program, which matches the code's execution:

```

Python 3.6.1 (default, Dec 2015, 13:05:11)
[GCC 4.8.2] on linux
Ich kann zählen
0
Weiter? - j/n j
1
Weiter? - j/n j
2
Weiter? - j/n j
3
Weiter? - j/n j
4
Weiter? - j/n 
  
```

repl.it/@CoderDojoSaar/05-Ich-kann-zahlen

06 - Buchstabentester


@CoderDojoSaar/06 - Buchstabentester
stop
share
+ new repl
my repls
CoderDojoSa...

main.py saved

```

1 print("Buchstabentester")
2 taste = "j"
3 while taste == "j":
4     wort = input("Bitte Wort eingeben: ")
5     if wort == wort.lower():
6         print("Das Wort besteht nur aus Kleinbuchstaben.")
7     else:
8         if wort == wort.upper():
9             print("Das Wort besteht nur aus Großbuchstaben.")
10        else:
11            print("Das Wort besteht aus Klein- und Großbuchstaben.")
12        taste = input("Möchtest Du noch ein Wort eingeben? - j/n ")
13    print("Danke sehr")

```

<https://06-Buchstabentester.coderdojosaar.repl.run>

```

Python 3.6.1 (default, Dec 2015, 13:05:11)
[GCC 4.8.2] on linux
Buchstabentester
Bitte Wort eingeben: hallo
Das Wort besteht nur aus Kleinbuchstaben.
Möchtest Du noch ein Wort eingeben? - j/n j
Bitte Wort eingeben: HALLO
Das Wort besteht nur aus Großbuchstaben.
Möchtest Du noch ein Wort eingeben? - j/n j
Bitte Wort eingeben: Hallo
Das Wort besteht aus Klein- und Großbuchstaben.
>

```

repl.it/@CoderDojoSaar/06-Buchstabentester

07 - Tierquiz



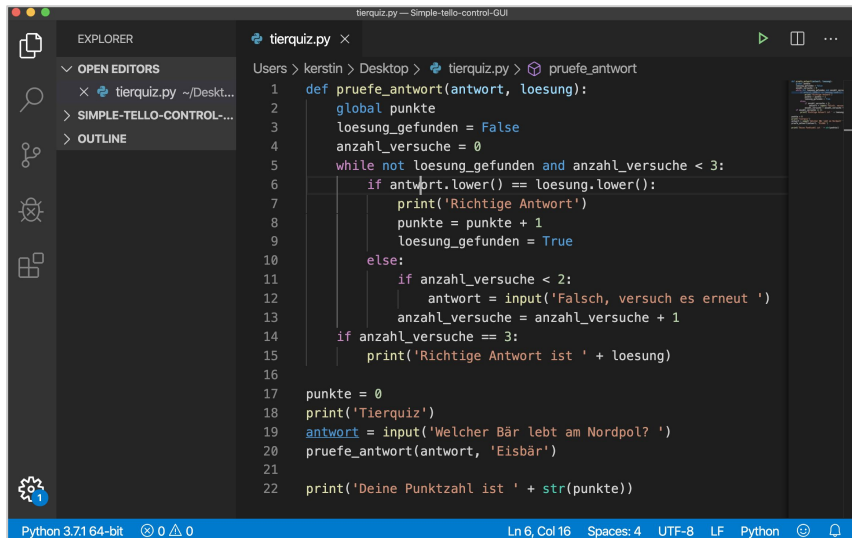
```
1  def pruefe_antwort(antwort, loesung):
2      global punkte
3      loesung_gefunden = False
4      anzahl_versuche = 0
5      while not loesung_gefunden and anzahl_versuche < 3:
6          if antwort.lower() == loesung.lower():
7              print('Richtige Antwort')
8              punkte = punkte + 1
9              loesung_gefunden = True
10         else:
11             if anzahl_versuche < 2:
12                 antwort = input('Falsch, versuch es erneut ')
13                 anzahl_versuche = anzahl_versuche + 1
14             if anzahl_versuche == 3:
15                 print('Richtige Antwort ist ' + loesung)
16
17     punkte = 0
18     print('Tierquiz')
19     antwort = input('Welcher Bär lebt am Nordpol? ')
20     pruefe_antwort(antwort, 'Eisbär')
21
22     print('Deine Punktzahl ist ' + str(punkte))
```

repl.it/@CoderDojoSaar/07-Tierquiz-in-schon

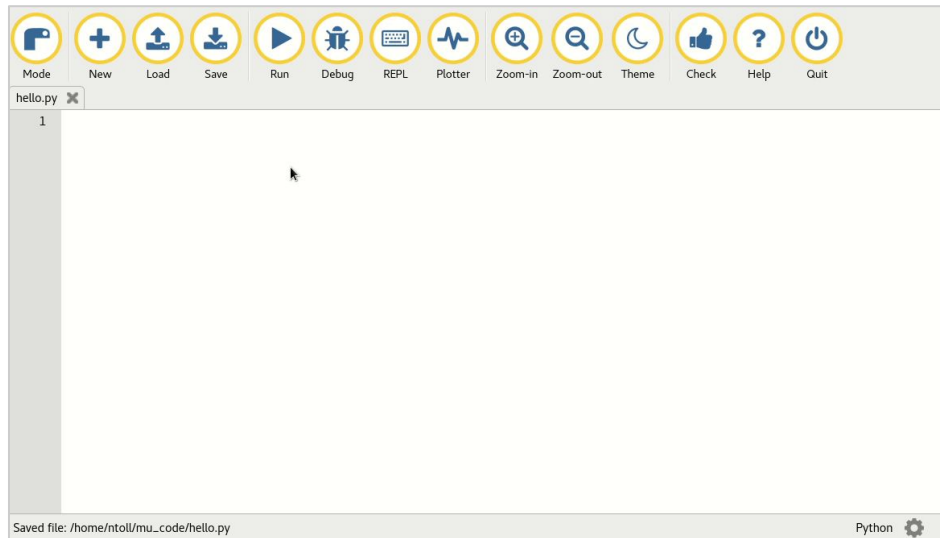
Welchen Editor sollte ich für Python benutzen?

Professionell, z.B. **Visual Studio Code**
 -> nicht für Anfänger und die Schule

Einfacher, z.B. **Mu Editor**
 -> zum Lernen besser



code.visualstudio.com



codewith.mu

Drohne programmieren



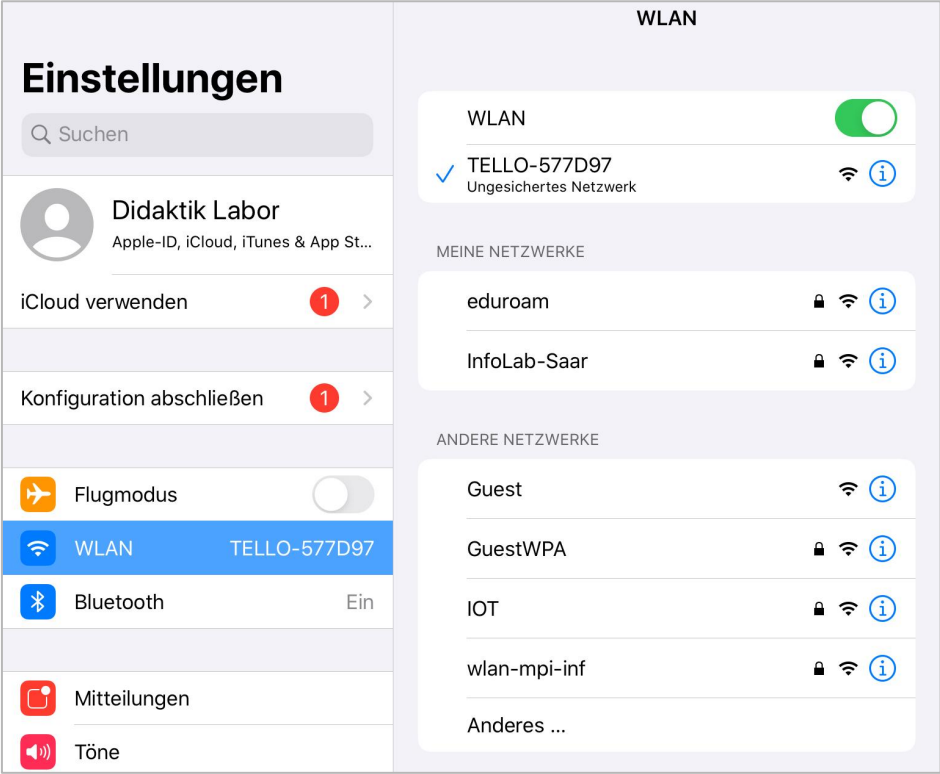
Bestandteile der DJI Tello



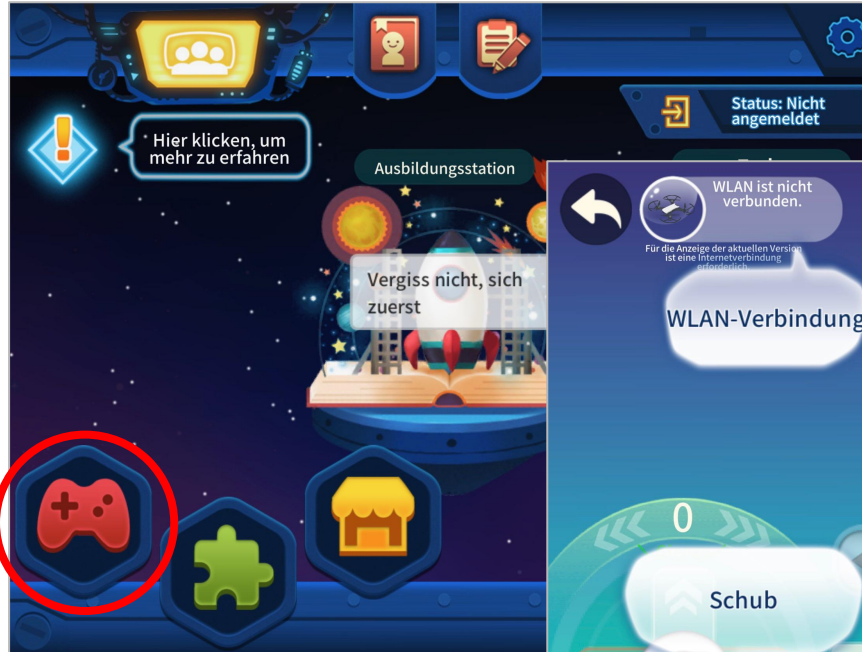
Wlan verbinden



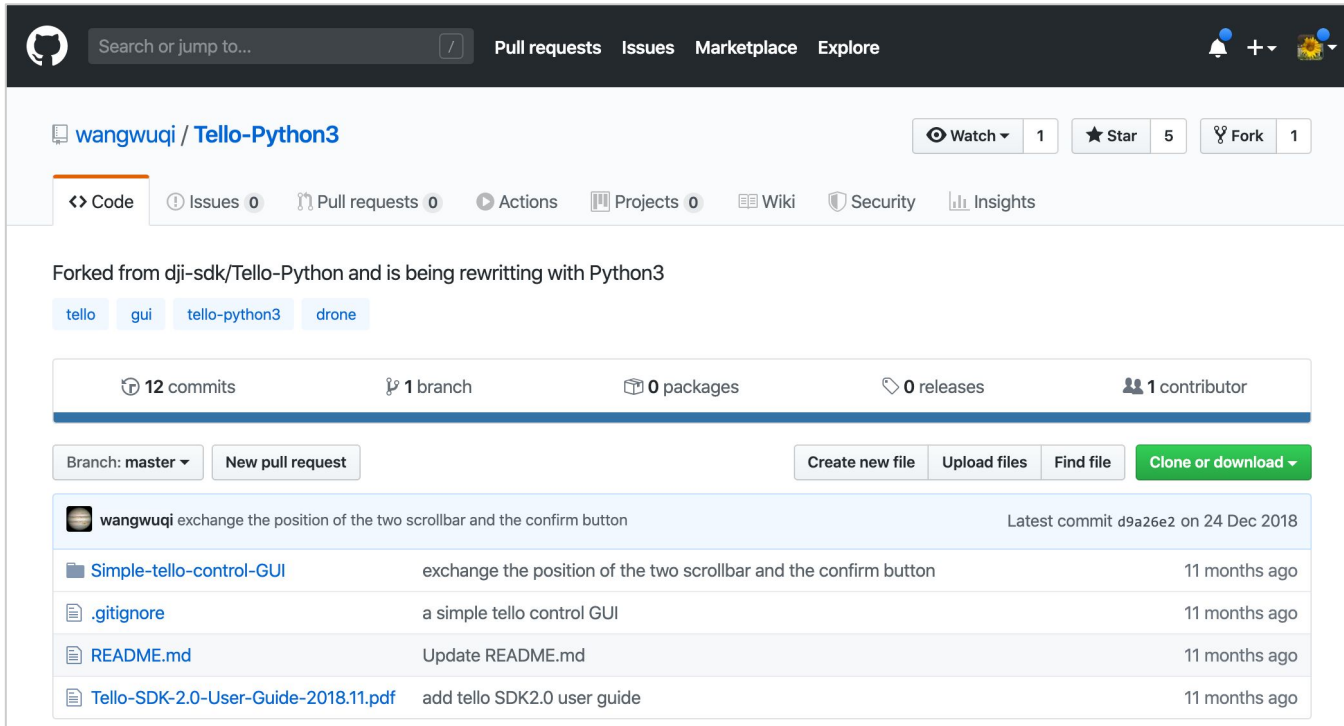
Mit Drohne verbinden
(Nummer beachten !)



App "Tello Edu" starten



Repo mit Tello-Bibliothek



The screenshot shows the GitHub repository page for `wangwuqi / Tello-Python3`. The repository is a fork of `dji-sdk/Tello-Python` and is being rewritten with Python3. It has 12 commits, 1 branch, 0 packages, 0 releases, and 1 contributor. The repository is currently on the `master` branch. The commit history shows four recent commits, all dated 11 months ago:

- `Simple-tello-control-GUI`: exchange the position of the two scrollbar and the confirm button
- `.gitignore`: a simple tello control GUI
- `README.md`: Update README.md
- `Tello-SDK-2.0-User-Guide-2018.11.pdf`: add tello SDK2.0 user guide

github.com/wangwuqi/Tello-Python3

DJI Tello mit Python 3 programmieren

```
1 from tello import Tello
2
3 tello = Tello()
4 tello.send_command("command")
5 tello.send_command("takeoff")
6 tello.send_command("land")
```

Neue Datei erzeugen und im Ordner
"tello" auf dem Desktop speichern!

- Datei tello.py mit Klassen-Definition Tello muss gefunden werden können!
- **Als erstes muss immer command an die Drohne geschickt werden.**



Kommandos für die DJI Tello

github.com/wangwuqi/Tello-Python3

Immer als erstes!	command	<code>tello.send_command("command")</code>
Geschwindigkeit	speed x x = 10 - 100 (in cm/s)	<code>tello.send_command("speed 10")</code>
Richtung	up/down/ left/right/ forward/back x x = 20 - 500 (in cm)	<code>tello.send_command("up 20")</code>
Drehen	cw/ccw x (counter)clockwise x = 1 - 360 (in Grad)	<code>tello.send_command("cw 90")</code>
Flip	flip x x = l oder r oder f oder b	<code>tello.send_command("flip b")</code>
Stop / Schweben	stop	<code>tello.send_command("stop")</code>
Alle Motoren aus	emergency	<code>tello.send_command("emergency")</code>

DJI Tello: Quadrat fliegen

```

1 from tello import Tello
2 |
3 tello = Tello()
4 tello.send_command("command")
5 tello.send_command("speed 10")
6 tello.send_command("takeoff")
7
8 for i in range(4):
9     tello.send_command("forward 20")
10    tello.send_command("cw 90")
11
12 tello.send_command("land")

```

- Python Dictionaries
- Python If...Else
- Python While Loops
- Python For Loops
- Python Functions
- Python Lambda

[ASCRIP](#)
[SQL](#)
[PYTHON](#)
[PHP](#)
[BOOTSTRAP](#)
[HOW TO](#)
[MORE ▾](#)
[REFERENCES ▾](#)
[EXERCISE](#)

The range() Function

To loop through a set of code a specified number of times, we can use the `range()` function,

The `range()` function returns a sequence of numbers, starting from 0 by default, and increments by 1 (by default), and ends at a specified number.

Example

Using the range() function:

```

for x in range(6):
    print(x)

```

Run example »

Note that `range(6)` is not the values of 0 to 6, but the values 0 to 5.



Python
The Ent

Help little Hobbits (beginners) to understand programming concepts

Help Wizards (computer scientists) to conduct researches

Wo ist Python in der Oberstufe?

Letzplan

Informatik

Gymnasiale Oberstufe

Querschnitt

Hauptphase

– Eingangsphase –

2016

Letzplan

Informatik

Gymnasiale Oberstufe

Leistungsfähigkeit

Hauptphase

– Eingangsphase –

2016

Ministerium für Bildung und Kultur
SAARLAND

Gymnasiale Oberstufe Saar (GOS)

Allgemeine Prüfungsanforderungen für das Abitur

Im Fach
Informatik
(APA Informatik)

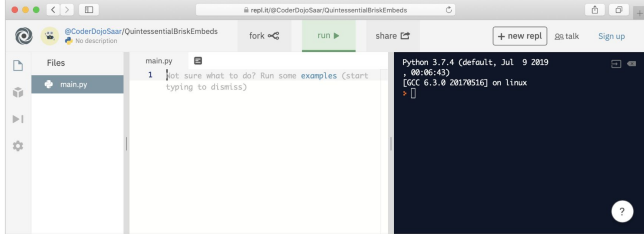
2019

Zugelassene Programmiersprachen sind DELPHI, JAVA und PYTHON.

Aufgaben zur Implementierung sollen in den Programmiersprachen Delphi, Java und Python mit gleichem Aufwand bearbeitet werden können.

Wo kann ich Python online programmieren?

Es gibt verschiedene Webseiten, auf denen man Python programmieren kann, z.B. repl.it



07 - Tierquiz



```

1 def pruefe_antwort(antwort, loesung):
2     global punkte
3     loesung_gefunden = False
4     anzahl_versuche = 0
5     while not loesung_gefunden and anzahl_versuche < 3:
6         if antwort.lower() == loesung.lower():
7             print('Richtige Antwort')
8             punkte = punkte + 1
9             loesung_gefunden = True
10        else:
11            if anzahl_versuche < 2:
12                antwort = input('Falsch, versuch es erneut ')
13                anzahl_versuche = anzahl_versuche + 1
14            if anzahl_versuche == 3:
15                print('Richtige Antwort ist ' + loesung)
16
17        punkte = 0
18        print('Tierquiz')
19        antwort = input('Welcher Bär lebt am Nordpol? ')
20        pruefe_antwort(antwort, 'Eisbaer')
21
22    print('Deine Punktzahl ist ' + str(punkte))

```

repl.it/@CoderDojoSaar/07-Tierquiz-in-schon

DJI Tello mit Python 3 programmieren

```

1 from tello import Tello
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3 tello = Tello()
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```

- Neue Datei erzeugen und im Ordner "tello" auf dem Desktop speichern!
- Datei tello.py mit Klassen-Definition Tello muss gefunden werden können!
- Als erstes muss immer command an die Drohne geschickt werden.

