

PROGRAMMING WITH PYTHON ON UBUNTU

Part 1

Build the Environment

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Abstract. After the description of how to use the python programming language under windows 10 starting from scratch in 6 posts we start here with some more posts dedicated to the question how to start programming with python under linux using the distribution ubuntu 14.04. This distribution is selected because we will use later the ros (robotic operating system) as well as the tensorflow library.

Keywords: python 2, python 3, spyder, ubuntu 14.04

1 Introduction

After a positive first test of programming with python 3 using the integrated development environment (IDE) *spyder* under windows 10, we want to check, whether we can transfer all the sources directly on an ubuntu platform, especially the distribution ubuntu 14.04 LTS, which has a long-term service guaranteed.

Actually there are more recent versions around (even ubuntu 17.10)¹, but because we want to extend our programming with the robot operating system (ros) and the tensorflow library we have to stick with ubuntu 14.04 for a while because ros is build on the ubuntu 14.04 version.

Therefore we will start with linux as presented in the distribution ubuntu 14.04.

1.1 Download And Install Ubuntu 14.04

The sourcecode for ubuntu 14.04 is given at the side <https://www.ubuntu.com/download/alternative-downloads> with the torrent versions. You can find the direct

¹ See: <https://www.ubuntu.com/>

iso-image *64-bit PC (AMD64) desktop* under the url <http://releases.ubuntu.com/releases/14.04/>. After downloading you have a full iso-image for ubuntu 14.04 file in your folder.

Now there are basically two ways to start a computer with such an iso-file: (i) before usb-sticks became so common one copied the iso-image on a CD or DVD and started the target machine with that disk.

Today it is more convenient to copy the iso-file to an usb-stick and start from this usb-stick². To do this one has to look into the BIOS of the target machine (while starting one has commonly to press the 'delete-Key' to interrupt the boot process and to have a look into the BIOS. There one can see whether the boot-process considers an usb-stick as an option. If not one has to select the option usb-stick, if possible at all).

If one has prepared a boot-process to look for an usb-stick one can put the usb-stick with the iso-image into the machine and start the machine. The rest is more or less automatic. One option which one can select and which is probably only of interest for more specialized guys is the selection of the LVM-option (Logical-Volume Manager). Using the LVM option one has a great flexibility to manage all possible disks later on demand very easily.

1.2 Prepare The SW Environment

After Booting the ubuntu 14.04 system on the target machine you have nearly infinite options what to do. We will concentrate here on those programs which we will use for our software-development work. Here are some of the tasks we want to support:

- Using the *synaptic* program to manage new software packages; sometimes directly only a console-window with the commands '*sudo apt-get install xxx*'.
- Using the file-manager *Krusader* to handle files across folders.
- Describing our project with *LaTeX* by using *TexStudio*
- Making our Diagrams for the documentation using the paint-program from *open office*.
- Using the program *shutter* to make screenshots for documentation.
- Using *gimp* for post-processing images.
- using *python 3* with the IDE *spyder*.
- Using the *simplescreenrecorder* to enable small videos from our programming work.
- Using the *VLC media player* for checking the quality of the video and to – eventually – compile another format.

² See here: <https://help.ubuntu.com/community/Installation/FromUSBStick>

Manage Programs To get new software packages with all the different dependencies it is helpful to install the program *synaptics*, a paket manager. To get it running we use the built in *ubuntu software center* program for the beginning. The new synaptics manager gives you then much more information and allows you more subtle decisions what to install and what to de-install afterwards than the built-in ubuntu software center.

In some situations it is even more comfortable to use directly a console-window and use commands like:

```
//Extend the scope for the manager where to look for software
sudo add-apt-repository universe
//Add a certain repository, that for the make usb stick
sudo add-apt-repository ppa:mkusb/ppa
//Then make an update of all resources
sudo apt-get update
//Then get the software for to generate an usb-stick
sudo apt-get install mkusb
//... together with the commandline only version
sudo apt-get install mkusb-nox
//... then use this new software for making an usb-stick
make-usb
```

Figure 1 gives you an overview of all the programs, which will be directly used by clicking once on the icon.

Filemanager 'Krusader' If one has Files distributed over many folders (what is somehow the usual case) then it is helpful to have a filemanager who can show you two folders in parallel and offers you the most needed file operations at a glance. This is what Krusader is doing.

In the figure 2 You can see two different folders and at the bottom different operations you can select. In the top section are even more options, and if you click with the right mouse button on the top of the window – what is not shown in this picture – then you will have a whole line of different menus with additional options. Thus this file manager gives you a strong support.

Type Setting with TeXStudio Programming is one thing, but to document, why you want which kind of a problem to program in a certain way and how you will do this is a different matter. Therefore you will need some way how to document.

As often there is a great variety of options. Working in the field of computer science and mathematics you have to use heavily formulas, mathematics and the like.



Fig. 1. Left-Sidebar with Programs to Click

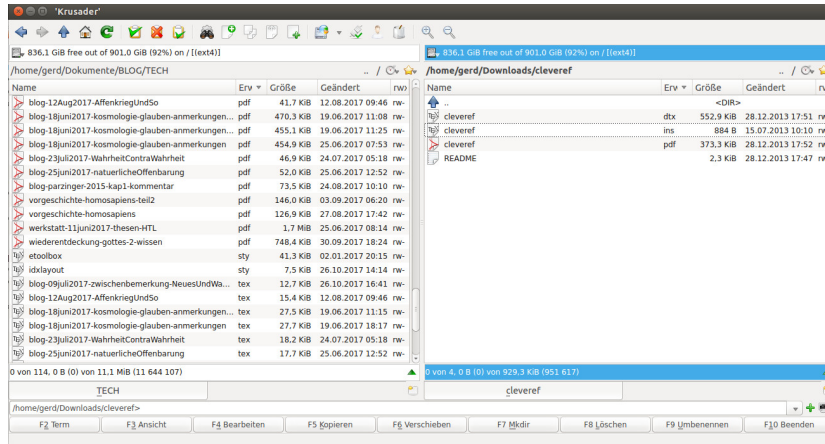


Fig. 2. Filemanager Krusader

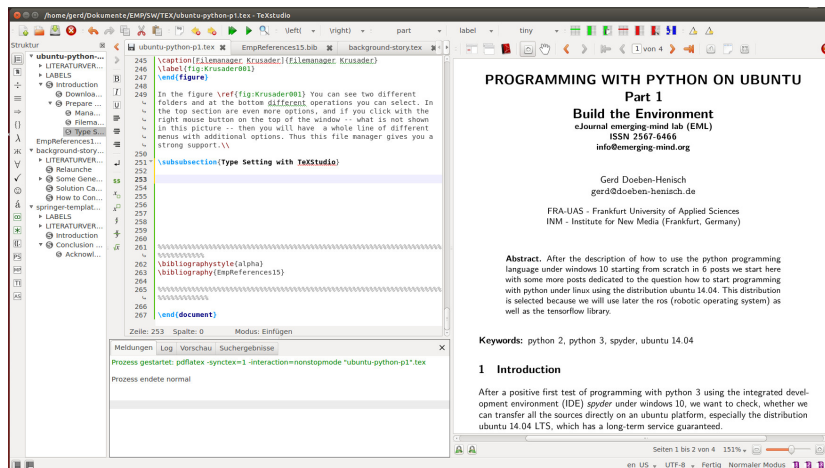


Fig. 3. Typesetting with TexStudio

For this there exists until today only one real option, this is the language *LaTeX*, a later version of the original *TeX*-language invented from *Donald E. Knuth*³

There are several programs around which support you using LaTeX. I am using since many years the program *TeXStudio* because it is very comfortable and – if you have to work in both worlds Linux and Windows – it is available in both worlds (see the figure 3).

Under Linux you activate the *Synaptics* program, type in 'textstudio' and there it is. You click that you want to install it and it will be installed immediately.

Because a text-document can include a great number of different options it can happen that you have to download some more packages to enable the usage of these options. You can see this either as cumbersome, if you have to do it, but on the other side it shows the great freedom and flexibility you have with such a system. You can start with a small setting and then you can enlarge it if needed.

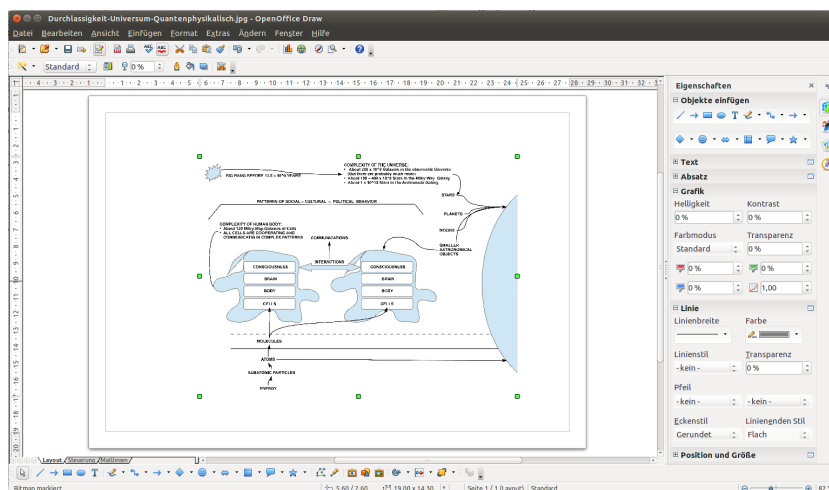


Fig. 4. Open Office Suite, here for drawing figures

Open Office for Drawing Somehow it is a shame to use *open office* – see figure 4 – mainly for drawing diagrams because this software is a wonderful whole package similar to Microsofts Office package, but simpler and – for free –. And, indeed, as a normal person or student you can do nearly everything with it: Writing, Calculating,

³ See a description of this scientist here: https://en.wikipedia.org/wiki/Donald_Knuth

Drawing, Data, Presentations. There is no need for more.

But to install it under ubuntu is a bit tricky because ubuntu 14.04 comes by default with 'Libre Office'. It is in some sense the same as 'Open Office', but I did use open office long before libre office, I am used to it, and indeed, I like it more. Therefore I downloaded and installed open office in parallel and against libre office, which occupied the link of open office and pointed the link in the 'wrong' (= libre office) direction. For an instruction how to do this read here⁴.

Screenshots with Shutter *Shutter* is a well designed program for making screenshots with many options. I will only mention it here. Using it is fun.

Image Manipulation with Gimp The image manipulation program *gimp* is also very well known from the Windows world. It is very powerful. I am using it mainly to format the pixel density (dpi), to change formats, or to manipulate photos. But you can do many more things with it. Especially under linux there is a whole bunch of libraries making it very powerful.

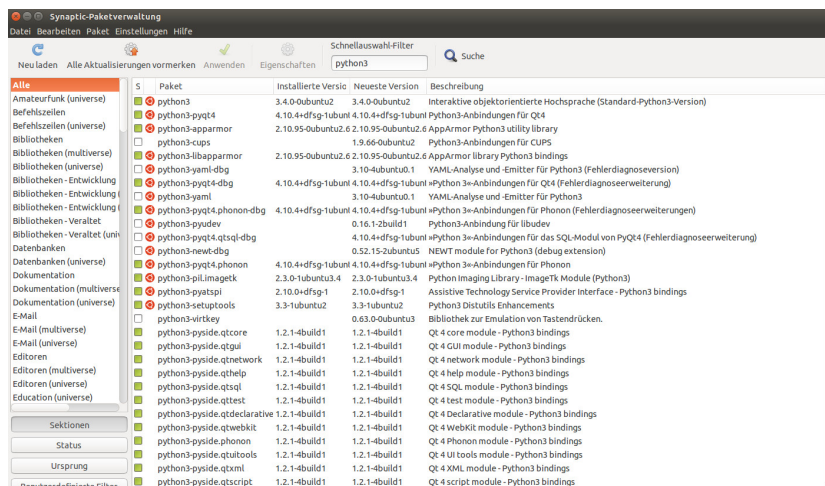


Fig. 5. List of Python3-packages under ubuntu 14.04 (You see only a fraction of the whole list)

Python 2 und 3 Under ubuntu 14.04 is *python 2.7.6* already installed because many programs, even those which are close to the system, are already programmed in python. Thus to de-install *python 2* – which is in principle possible – would destroy the

⁴ <https://www.openoffice.org/download/common/instructions.html#linux-deb>

system by it's 'inner logic' and the process of de-installation would somewhere getting 'stuck'; the system can no longer work correctly. I know this because I didn't know 'from the beginning' how deep the ubuntu system is interwoven with python...Thus producing failures is always the most direct way to learn something new :-)

Nevertheless there is *python 3* out and available and clearly you want to use it. As I have described it in the *papers 1-6 about Programming with python*⁵ you can read something about the versions and the possible development environments.

Luckily, under ubuntu 14.04 it is nevertheless very easy to install *python 3* directly and separated from python 2 (see figure 5).

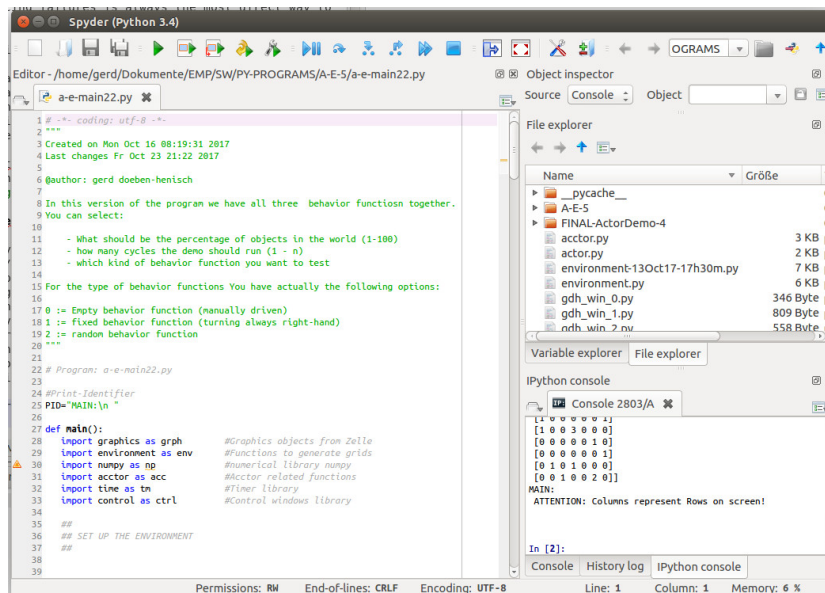


Fig. 6. The integrated development environment (IDE) *spyder*

Spyder As You could already read in the before mentioned papers 1-6⁶ or as you will read in the upcoming papers about programming with python under ubuntu 14.04 you can clearly use python with the python console as a stand alone endeavor. But it is not really productive. To make live more fun and productive great people have

⁵ Starting here: <https://emerging-mind.org/2017/10/14/programming-with-python-part-1-a-simple-actor-environment-demo/>

⁶ <https://emerging-mind.org/2017/10/14/programming-with-python-part-1-a-simple-actor-environment-demo/>

started to program so-called *integrated development environments (IDEs)*, which offer you a more sophisticated workplace with many nice tools. Such an IDE is the software *spyder* (See figure 6).

There are also other good and eventually even in some sense 'better' IDEs like *pyCharm*⁷, but *pyCharm* is 'only' an editor without the associated language. For some reasons this is good (and flexible), but for some reasons – especially with python3 it is bad –, because python3 has many different extension modules which are partially difficult to integrate manually. One of these important extension modules is the mathematical modul *numpy*.

In case of the *spyder-IDE* the language python 3.4.3 with most of the important modules is included in the package. This is one reason why it makes *spyder* such a nice IDE.

Another reason is that *pyCharm* uses heavily Java as a platform. Java is a nice language, but if you don't want to use java it is an unnecessary feature.

And finally, as you can experience next, *spyder* is a really nice tool: it has enough to work professionally, but it is still simple enough not to flood you with numerous details which could be confusing.

Screen Recording with the 'simplescreenrecorder' When I started writing for the emerging-mind lab I didn't really plan to make additional videos for explaining things. But today youtube changed the world of communications so heavily that I finally decided to give this 'videotization' a chance. But how to do it?

A friend gave me the hint with the program *simplescreenrecorder*. It was some work to find out how to integrate it into ubuntu 14.04, but when I found the following commands for the console:

```
//You tell the software manager to open the view for more places,
//here for the place of maarten bart
sudo add-apt-repository ppa:maarten-baert/simplescreenrecorder
//After open the view you urge the system to check updates
sudo apt-get update
//Then you give the command to install the program
sudo apt-get install simplescreenrecorder
```

it became very simple (see figure 7). With this screen recorder it is very simple to define an area of your screen for recording with many formats. You can also add

⁷ See: <https://www.jetbrains.com/pycharm/>



Fig. 7. The 'simplescreenrecorder' program

sound, if you want.

In case of the sound it is also very straightforward. But if you have special equipment like me (external mixer etc.) than you have to experiment a little bit, how to do it. But, as you can see and hear it works. My ideal is not to have a most professional production but a cheap, simple, and fast way to communicate a little bit more than only to write texts and showing isolated picture.

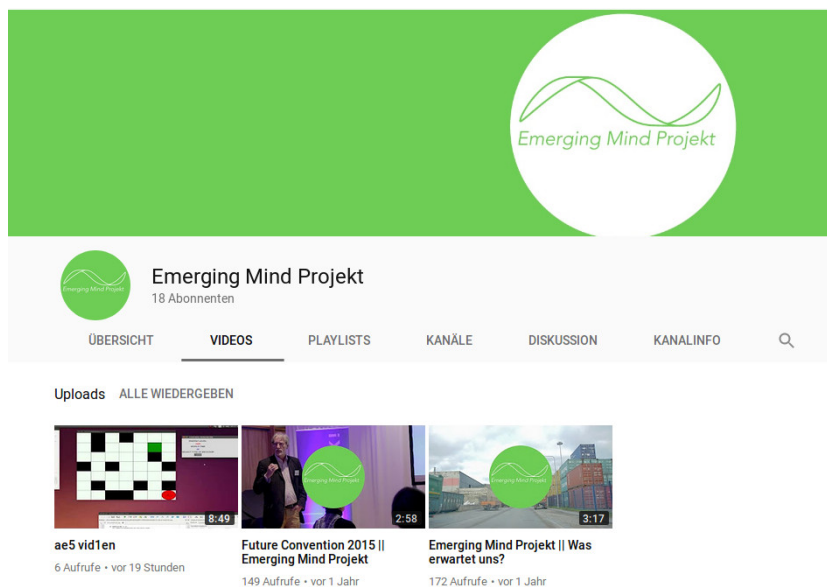


Fig. 8. The youtube-channel of the emerging-mind lab (with a bit of the old history :-))

And, indeed, there existed still a youtube-channel from the old version of the emerging-mind lab (EML), originally called *Emerging-Mind Projekt*⁸. Thus I re-activated this channel again and started to fill it up with new videos (not so 'nice ones' like before :-))(see figure 8).

VLC Media Player The VLC-Media Player – well known from the windows world too – is strictly speaking not necessary for our project, but if you want to check the outcome of your video production, than it is a really nice tool. And, not to forget, the vlc-player is much more than only a simple video-player. But this you can detect it if you need it.

⁸ See: <https://www.youtube.com/channel/UCGI1Endz2OFKAVzjxGf45hA/videos>

And Even More ... Having reached this point I have to state, that there are even more programs, I am using heavily, which I have not yet mentioned. Here are some:

1. *mozilla* Web-browser (well known also for windows)
2. *filezilla* a very well known (s)ftp-program, in the windows world too.
3. *audacity* a multi-track sound tool for recording, editing and playing.
4. ...