

# The Training of Making Graphical User Interface (GUI) Using Python for Teachers and Students of Engineering Vocational School in Purwakarta

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## ABSTRACT

*The purpose of this community service activity is to introduce the Python programming language to teachers and students of vocational school in Purwakarta exploiting an application to create a simple graphical user interface (GUI). Python is a programming language that is currently trending. The training was carried out in 3 stages, namely preparation, implementation and evaluation. As a result, participants were able to follow this training well and were able to create their own version of a simple GUI. Participants were also able to integrate their GUI with Arduino. After this activity, participants are expected to be able to explore how to make simple GUI using the modules that have been given.*

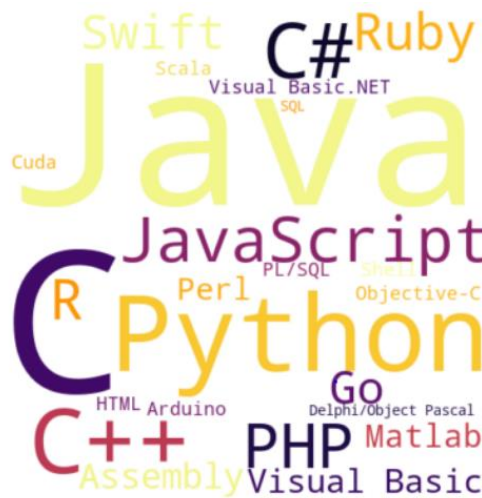
**Keywords:** Python, GUI, Arduino, Vocational School, Teacher, Student.

## 1. INTRODUCTION

Basic sciences such as mathematics, statistics and programming are some of knowledge branches needed in the industrial world (**Sitio, Sindar, Marbun, & Tiara, 2022**). To solve mathematical and statistical problems we can use an existing programming language (**Olsen, 2018**). Firstly, we have to master programming algorithms before we can apply mathematics and statistics into programming languages. One of the most popular programming languages today is Python.

Python is a high-level programming language created by Guido van Rossum in 1980 (**Eroglu S., Toprak S., Urgan O, MD, Ozge E. Onur, MD, Arzu Denizbasi, MD, Haldun Akoglu, MD, Cigdem Ozpolat, MD, Ebru Akoglu, 2012; Guttag, 2013**). Because it is a high-level programming language, python is easier to understand for beginners (**Ozgur, Colliau, Rogers, & Hughes, 2021**). Currently, Python is a computer programming language that is widely used in various scientific applications such as automation, big data, data science, computer graphics, calculus, artificial intelligence and web development (**Sotomayor-Beltran, Segura, & Roman-Gonzalez, 2019**). Python is currently the most popular

programming language in the world after C and Java (**Rawat, 2020**). Figure 1 is popular programming languages used in the world.



**Figure 1. Popular programming language used in the world.**

A more detailed ranking of the programming language popularity in the world based on data from the TIOBE index (**Tiobe.com, 2018**), IEEE Spectrum (**Diakopoulos & Cass, 2017**), Github (**Octoverse.github.com, 2017**) dan Stack Overflow (**Insights.stackoverflow.com, 2017**) can be seen in figure 2.

TIOBE	IEEE Spectrum	Github	Stack Overflow
Java	Python	JavaScript	JavaScript
C	C	Python	SQL
C++	Java	Java	Java
Python	C++	Ruby	C#
C#	C#	PHP	Python
Visual Basic.NET	R	C++	PHP
PHP	JavaScript	CSS	C++
JavaScript	PHP	C#	C
Delphi/Object Pascal	Go	Go	TypeScript
Ruby	Swift	C	Ruby
SQL	Arduino	TypeScript	Swift
Visual Basic	Ruby	Shell	Objective-C
R	Assembly	Swift	Visual Basic.NET
PL/SQL	Matlab	Scala	Assembly
Assembly	Scala	Objective-C	R
Swift	HTML	-	Perl
Perl	Shell	-	VBA
Go	Perl	-	Matlab
Matlab	Visual Basic	-	Go
Objective-C	Cuda	-	Scala

**Figure 2. Ranking list of the most popular programming languages in the world based on the 4 major programming industries.**

In Figure 2, Python is ranked in the top 5 in all surveys conducted by the 4 major programming industries in the world. This did not happen suddenly. Python has several advantages for its users, namely (**Rawat, 2020**):

- The language used is simple and easy to understand
- Python can be used equally across operating system platforms such as Windows, Linux and MacOS.
- Unlike other programming languages that require a license to use their features such as MATLAB, python is free and open source.

- The world's major corporations such as Youtube, Google, Facebook, and IBM use python. If we master python, then we have a great opportunity for a career in this big company.

Based on this background, it is important for teachers and vocational students to be introduced to the Python programming language so that they can follow current industry trends. This community service program target students and teachers from SMK in Purwakarta Regency, West Java. For students, this introduction to python programming can increase their competence in the field of programming and can follow the latest programming language trends. For teachers, this service activity can attract them to continue to update materials and adapt to material developments related to programming.

This python training plan was done offline. The topics of discussion that were presented are as follows:

- Basic introduction to the python programming language
- Introduction to a simple Graphical User Interface (GUI) using python
- Create a simple GUI using python. The software used is Thonny IDE and Notepad++.

Integration of the GUI that has been made with the Arduino Uno hardware (on off the Arduino Uno LED with the GUI that has been created).

## 2. METHODS

The methods of this community services were separated into 3 stages namely preparation stage, implementation stage and evaluation stage (**Al Maududi, Putri, & Hartuti, 2021**).

### 2.1 Preparation Stage

At the preparation stage, the team discussed about technical matter such as participant target, guidance module, required components, wiring components and room preparation.

### 2.2 Implementation Stage

The team conducted teaching activities to the participants while participants try to implement the guidance module to make the GUI. if participants had difficulty, the team would help them before continuing the presentation.

### 2.3 Evaluation Stage

At each given step, the team evaluated whether the participant had succeeded in carrying out the given step or not. After the material and practicum were completed, participants were given a questionnaire to evaluate this community service activity.

This community service activity was carried out in Sistel Classroom, 4<sup>th</sup> floor, New Building, Universitas Pendidikan Indonesia, Purwakarta Campus. The participants were teachers and students of Vocational School (SMK) in Purwakarta.

## 3. RESULTS AND DISCUSSION

Python is a programming language that is currently trending. For that, teachers and students in vocational schools should start to know about python (**Ayer, Miguez, & Toby, 2014**). With that background, the team held this activity. The community service activity was carried out on Saturday, August 13, 2022, 08.00-12.00 at UPI Purwakarta Campus. The activity was attended by 30 participants consisting of 18 teachers and 12 students in Purwakarta. The

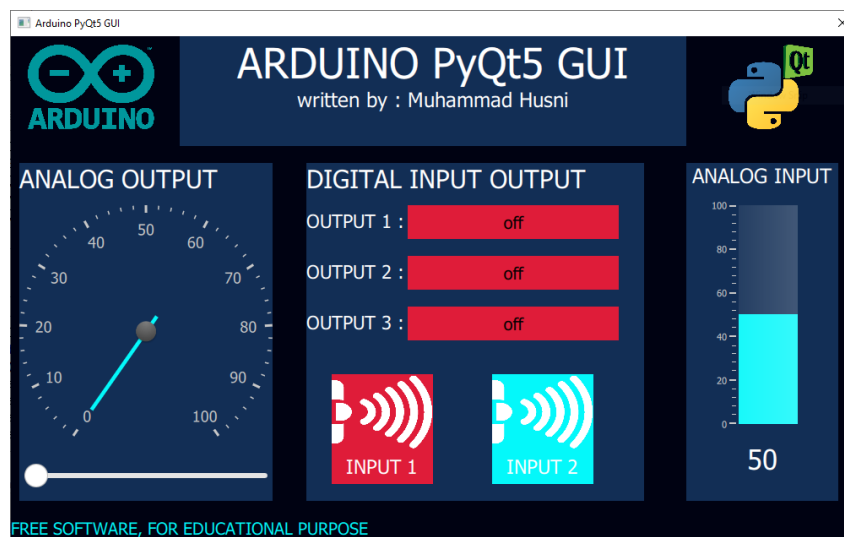
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activity began with an opening remark from the Director of UPI Purwakarta Campus, Prof. Turmudi, Ph.D and the head of the Mechatronics and Artificial Intelligence study program, Dewi Indriati Hadi Putri, S.Pd., M.T. via online meeting. The opening ceremony is as in figure 3.



**Figure 3. Opening ceremony of community services activity.**

The event continued with the first presentation by Diky Zakaria, S.Pd., M.T. with the material "Brief Introduction of Python Programming". The second presentation was delivered by a python programmer from PT. Syergie Indoprime, Husni Muttaqin, S.Pd with the material "Step by Step GUI Development with Python and QML". The target of this training was to create a simple GUI with an example in Figure 4.



**Figure 4. A simple GUI to create.**

Participants had to install the required applications in order to take part in this training. The applications needed are Thonny IDE, Notepad++, Arduino IDE and CH340 driver. Participants were given a guidance module that had been prepared. The composition of the material presented in making this GUI are:

- How to make windows
- How to add text
- How to make buttons
- How to insert pictures
- How to make a slider
- How to make a gauge
- How to make a rectangle
- How to combine all functions into an attractive and informative GUI.

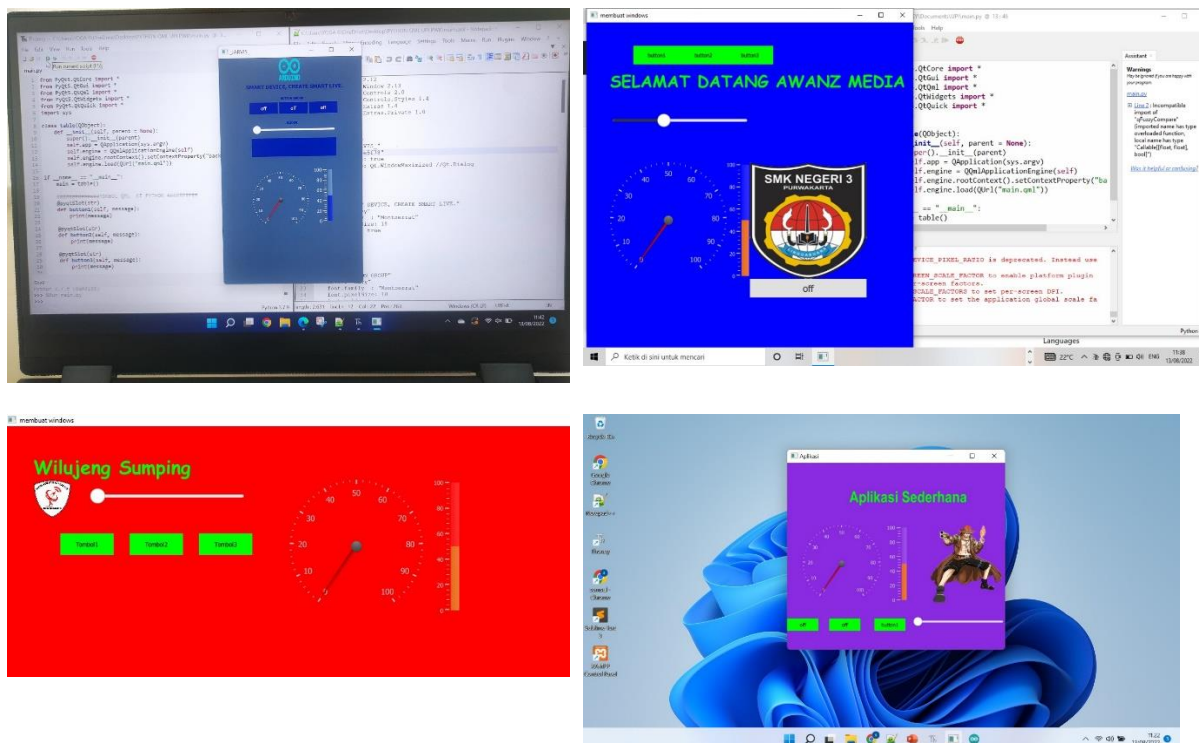
Furthermore, participants were guided to integrate the GUI so that they could turn on the Arduino LED. The step was that participants were guided how to interface between python-QML-serial Arduino and vice versa. The process of this community services is as in figure 5.



**Figure 5. Documentation of the community services activity.**

Some participants managed to create their own version of the GUI and some were still having trouble. Participants who had difficulty could continue to practice based on the modules that had been given and could communicate with the team for further guidance. Figure 6 shows an example of a GUI that was created by the participants.

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**Figure 6. GUI created by participants.**

After the training was completed, participants were asked to fill out a questionnaire evaluating the implementation of this training. The questionnaire consisted of 8 questions rated on a Likert scale of 1-4, 1 means not good, 4 means very good (Ivanov, Ivanova, & Saltan, 2018). From 30 participants, only 23 participants filled out the questionnaire. Table 1 shows the results of the evaluation of the trainees.

**Table 1. Evaluation results of community service activity by participants**

No	Questionnaires	Scores			
		1	2	3	4
1	How is the instructor's mastery of the material?	0%	8,70%	21,70%	69,60%
2	How is the systematic presentation of the material?	0%	4,30%	52,20%	43,50%
3	The benefits of this training for you	4%	0%	8,70%	87%
4	Team sensitivity to the difficulties experienced by participants	0%	4,30%	30,40%	65,20%
5	Participants are interested in learning more about creating this GUI in python at home	0%	4,30%	21,70%	73,90%
6	Activities supporting facilities (Place, consumption, presenters, and other supports)	0%	0%	17,40%	82,60%
7	The instructor's empathy for the diversity of training participants' competencies	0%	4,30%	13%	82,60%
8	Overall implementation of this activity	0%	4,30%	17,40%	78,30%

Based on table 1, the majority of participants considered this training very good, starting from the mastery of the material, the systematics of the training, the sensitivity of the committee, the usefulness of the training and the support of the training facilities. There are 4% (1 vote) who gave a score of 1 on the statement "the benefits of this training for you". It becomes an evaluation and input for the team to improve in the future training. But overall, this training received a good response from the participants. One obstacle presented by the participants

was related to the limited training time. One suggestion from participants is that this training should be held several times. The training was only conducted once due to budget constraints. Understanding this limitation, the team provides modules that can be used as material for participants to practice independently and to guide them using this python programming language to fulfil their needs.

#### 4. CONCLUSIONS

Python is a programming language that is currently trending. Many technology companies use python in building their applications. To make students and teachers have the ability to adapt to technological developments, an introduction to Python is needed. This community service activity aims at introducing python programming in applications to create a simple GUI and its relationship to hardware. Overall, the participants were able to take part in this activity well and were satisfied with this training. Few evaluations from participants were related to the training which was only conducted in one meeting. Apart from that, participants were satisfied and interested in exploring Python through the modules that have been given.

#### ACKNOWLEDGEMENT

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