

## ARCHITECTURAL ELEMENT OF ROSE FLOWER DECORATION SHOWN WITH PYTHON

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**ABSTRACT:** The paper presents: a program for drawing an architectural element of decoration in the form of a rose flower on the example of a rosette (floral design), for example, the Cathedral of St. Stoic in Zadar, the *Python* programming language that created a rose flower decoration element, an explanation of the main function of the program, a function that draws a circular clip of a circle, and a function that colors circular clips. The program in the paper is presented in code view and design view and allows users to: enter x, y coordinates using the application form, enter the radius length over the form, and enter the number of sheets in the form. Eventually, the program will print a form in which the user will be able to choose to repeat the drawing of the rosette (by selecting the option yes) or not. Each command used in the program was also explained in detail, and loops and corresponding branches were applied.

**Key words:** *Python, floral design, application forms, loop 'for', branching 'if-else', functions*

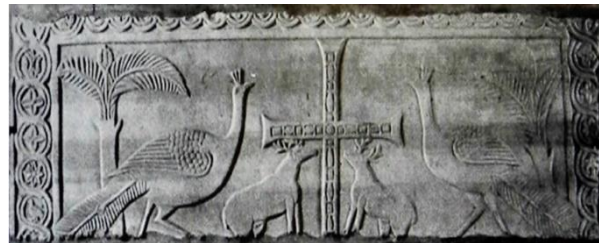
### INTRODUCTION

The article titled “The Architectural Element of Rose Flower Decoration” presented in this work includes a program created in Python that draws architectural elements of rose flower decoration using the example of a rosette (floral design), for example, the Cathedral of St. John. Stoic in Zadar. The Python programming language that created the rose flower decoration element is presented in the paper. Python is an object-oriented scripting language and, in addition to object-oriented, also allows procedural programming methodology [5]. Python is used by well-known corporations such as Google, NASA, IBM, Autodesk, etc. [6]. The paper explains: the main function of the program, the function that draws a circular clip of a circle, and the function that paints circular clips. The program is presented in code view and design view and enables users to: enter x, y coordinates using the application form, enter the radius length over the form, and enter the number of sheets in the form. Finally, the program prints a form in which the user can choose to repeat the drawing of the rosette (by selecting the yes or no option). Each command used in the program is also explained in detail, and loops and branches are applied in the code view of the application.

## THE ARCHITECTURAL ELEMENT OF THE 'ROSE FLOWER' DECORATION

The architectural element of the "Rose Flower" decoration can be seen at numerous cathedrals and can, of course, also be displayed using a program (application) created in a specific programming language. This work uses a Python program to create a rosette.

**Figure 1.** Views of: (1a.) The architectural element of the "Rose Flower" decoration and (1b.) The page of the sarcophagus of Bishop Ecclesia of San Vitale in Ravenna [2]



Source (1a.) Images: Co-author's photo; and Source (1b.) Images: Miskovic, A. Original scientific paper [2] (Bishop Ecclesia's sarcophagus of San Vitale in Ravenna).

Figure 1 (1a. and 1b.) Shows the architectural element of the "Rose Flower" decoration on the example of St. Stoic in Zadar, i.e. on the example of a rosette (within the frame of blue). A rosette is an architectural element of a rose flower decoration with stylized petals applied from Romanesque. Most often as a decorative window on churches and halls [1]. Also, in Figure 1b above, one can see the page of Bishop Ecclesia's sarcophagus from San Vitale in Ravenna [2] where a rosette is also visible. The early Gothic Notre-Dame Cathedral in Paris also has two rosettes located at the ends of the transepts and are the largest rosettes in Europe [8].

## PROGRAM IN PYTHON – 'ROSE FLOWER' DECORATION

Chapter 3 shows a program created in Python to decorate a rose flower in a design view according to the options used to create a rose flower as desired.

**Figure 2.** Demonstration of x, y coordinates (centre of circle)

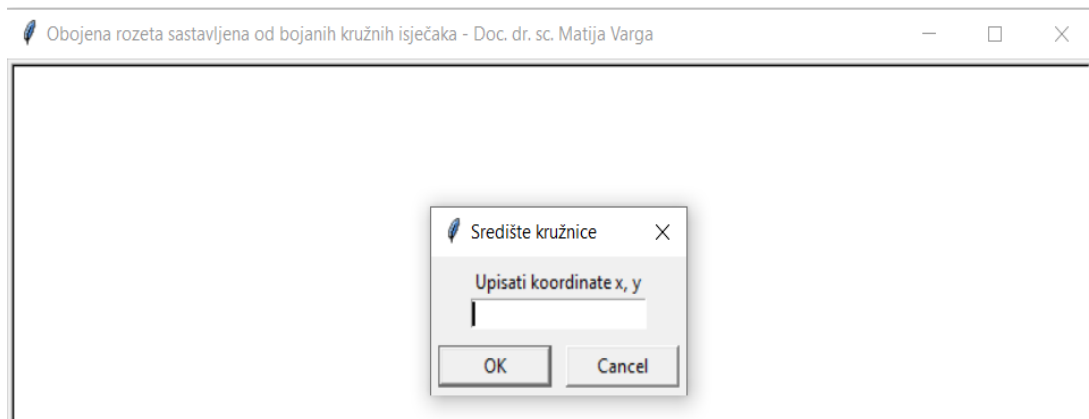


Figure 2 shows the ability to write the coordinates x, y (centre of a circle) in the form of the center of a circle created by Python. Also, the picture shows the title of the program called: "Colored Rosette Made of Colored Circular Clips" created by the command `title('')`.

**Figure 3.** Demonstration of the possibility of entering the radius length within the radius form

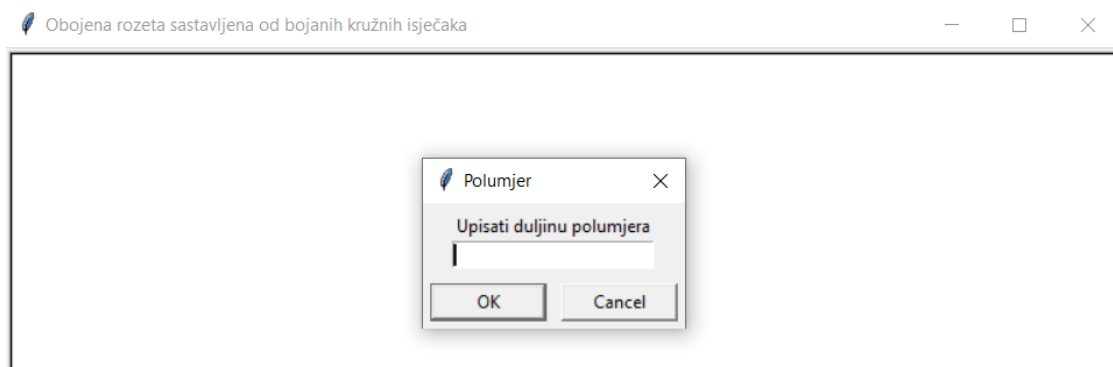


Figure 3 shows the possibilities of entering the radius length within the radius form. The radius form with radius length capability is created in Python programming language.

**Figure 4.** Demonstration of the ability to define the number of rosette sheets

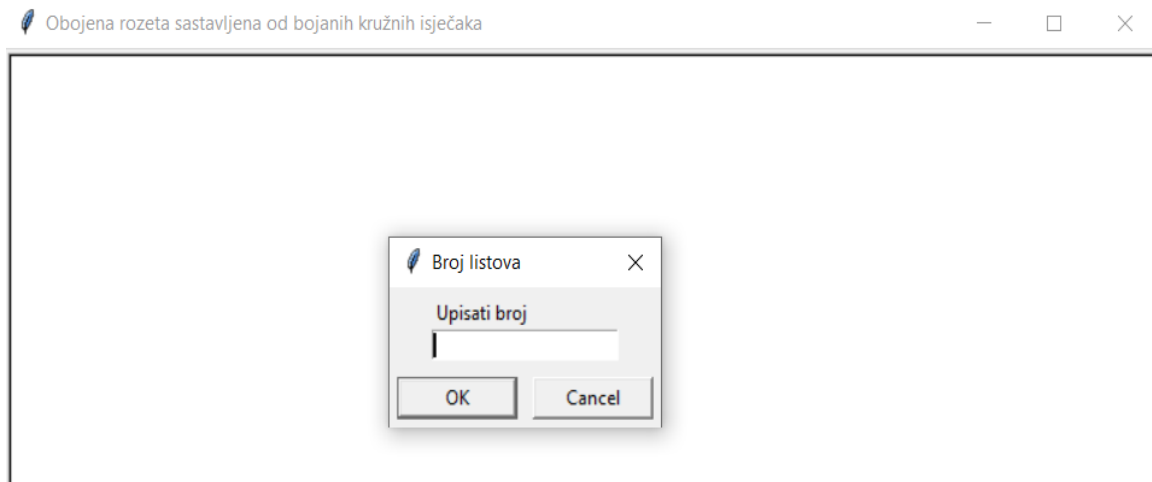


Figure 4 shows the ability to define the number of rosette sheets within a form called "Number of sheets" (In Croatian: „Broj listova“). Entering the number will create a corresponding rosette with a given number of sheets.

**Figure 5.** Demonstration of the possibility of repeating data in rosette layout forms

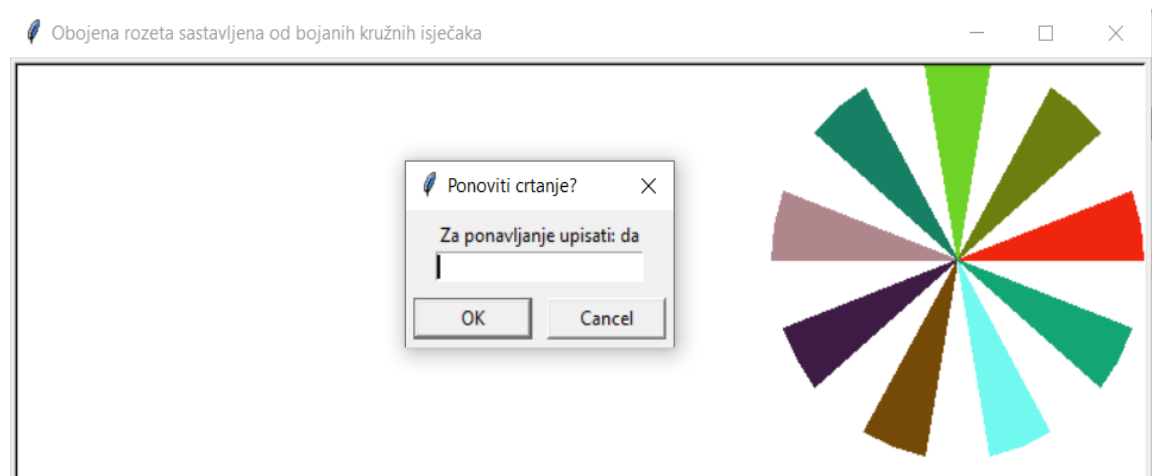


Figure 5 shows the possibility of repeating the data in forms that define the appearance of the rosette (as shown in Figure 2, Figure 3 and Figure 4). To allow the parameter input form to be restarted while creating the rosette, the while loop and if else branching were used.

Branching represents a binary operation true or false because it is based on choosing one of two options. An example of branching can be to examine the relationship of numbers using a comparison operator after which as a result we obtain one of two possible values (true or false) [4]. The rosette in Figure 5 created by the user of the application contains nine sheets of different colours, with sheets of the same size.

Figure 6 shows rosettes with 16 sheets of different colours (right) compared to the rosette of St. Stephen's Cathedral. Stoic in Zadar (left). Both rosettes have 16 leaves on the flower.

**Figure 6.** View of a rosette of 16 sheets of different colors (right) compared to the rosette of St. Stosije in Zadar (left)



Source (6a.) Images: Co-author's photo; and Source (6b.) Images: rosette design by application.

### A PROGRAM FOR DRAWING A ROSE FLOWER

This (fourth) chapter shows the code in Python that was used to create the coloured rosette of the desired size (the rosette itself) and the desired coloured circular clips that make the rosette as a whole more interesting. The program allows the user to create a rosette only, which means that the user selects the size of the rosette as well as its parts (sheets) using the program, ie the offered options within the forms. An example of a program written in Python for drawing a rose flower (rosette) with code explanations (below):

```
# Crtanje rozeta sastavljenih od kružnih isječaka ('English translation: Drawing rosettes  
composed of circular clips')
```

```
from turtle import *
```

“*From turtle import \**” is also a call structure that can be called by a module by calling only some or all of the functions in the module [3].

```
import random
```

“‘Import random’ used to call the library for random and used to display a random number (colour) [7].”

*title('Obojena rozeta sastavljena od obojenih kružnih isječaka' (English translation: 'Coloured rosette composed of coloured circular clips'))*

```
def kruž_isječak(x_s, y_s, r, kut_p, kut_i):
```

“‘The function ‘circle\_clip’ (In Croatian: ‘kruž\_isječak’) draws a circular clip of a circle while *x\_s*, *y\_s* are the centre coordinates. *R* is the radius of the circle while ‘angle\_p’ (In Croatian: ‘kut\_p’), the angle of rotation of the clip in degrees (‘angle\_p’ is measured from the x-axis, clockwise, type ‘int’ or ‘float’). Each more complex program contains a cluster of data, that is, multiple different data to be stored. The angle *i* is the centre angle of the circular section (‘int’ or ‘float’ type). For example, the same data types are used in other programming languages such as C programming language and C ++ programming language.”

```
ht(); pensize(1); seth(0)  
pu(); goto(x_s, y_s); pd()  
lt(kut_p); fd(r)  
lt(90); circle(r, kut_i)  
lt(90); fd(r)  
return
```

“‘The used ‘pd()’ command returns the pen to paper so that the next drawing leaves a mark. Return is a command that is appended to the end of a command block.”

```
def obojena_rozeta(x_s, y_s, r, br_listova):
```

```
    kut_i = 180 / br_listova  
    colormode(255)  
    tracer(False)  
    for i in range(br_listova):  
        R = random.randint(1, 255)  
        G = random.randint(1, 255)  
        B = random.randint(1, 255)  
        color (R, G, B)  
        begin_fill()  
        kut_p = 2 * i * kut_i
```

```
kruž_isječak(x_s, y_s, r, kut_p, kut_i)
end_fill()
tracer(True)
return
```

“The coloured rosette function colours the sheets randomly and returns each sheet coloured in a different colour when printing the sheets.”

```
def main():
    ponavljanje = True
    while ponavljanje:
        sr_kru = textinput('Središte kružnice', 'Upisati koordinate x, y').split(',')
        x_s = int(sr_kru[0]); y_s = int(sr_kru[1])
        r = int(textinput('Polumjer', 'Upisati duljinu polumjera'))
        n = int(textinput('Broj listova', 'Upisati broj'))
        obojena_rozeta(x_s, y_s, r, n)
        pon = textinput('Ponoviti crtanje?', 'Za ponavljanje upisati: da')
        if pon == 'da':
            reset(); ht()
        else:
            ponavljanje = False
    return
```

“In the main function ‘def main’ defines what the user must type in application forms in order to print the desired rosette. The user must enter: x, y coordinates, radius length, number of rosette sheets, and after printing the rosette, determine whether or not to enter values for printing a new rosette. When creating a rosette, the application allows the input of numeric data types (‘int’ type) but text types (when selecting ‘yes’ or ‘no’).”

```
main()
pu()
goto(0, -280)
pencolor('black')
write('Klikom miša na gumb X okončati program', align = 'center')
mainloop() '
„[1], [2], [3], [4], [5], [6], [7]“.
```

## CONCLUSIONS

Based on the expert research conducted and described in this paper, on the theme "Architectural element of rose flower decoration depicted by Python", it is concluded that the work links the field of architecture with programming, which is not a very common case (frequent occurrence) in practice. It is well known that programming as a command-writing process in a particular programming language is used in almost all sciences in order to create an application that will enhance processes or individual modules. We can certainly say that this article is a certain novelty linking the field of programming with the field of architecture. The contribution of the work can be seen by showing the modules used in the program to create rosettes of different sizes, and explained codes (and separate functions) that make the program whole. Also in the paper is a novelty in how to compare two rosettes, the first made using an application created in Python with the ability to select the size and number of sheets and the second rosette at the Cathedral of St. Stoic in Zadar. Also, many cathedrals are known to have rosettes. The early Gothic Notre-Dame Cathedral in Paris, for example.

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