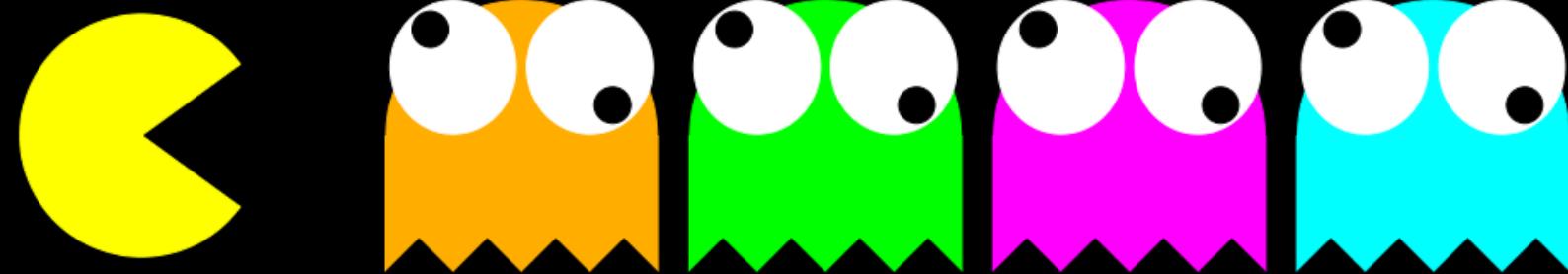


How to make games in GeoGebra.



Geo-Pac, czyli jak tworzyć gry w
GeoGebrze.

by Mateusz Kifner

Presentation resources

mk.ssa.iq.pl



Portfolio / Blog

Mateusz Kifner

[!\[\]\(31dc830bf8206b94b5a585ce61ce9013_img.jpg\)](#) [!\[\]\(92fe6ec8c8b0011d3746d04c5962f469_img.jpg\)](#) [!\[\]\(331831374f10e8c7fe483c7fa2c6e388_img.jpg\)](#) [!\[\]\(59a6d1a83fdb24579739802677391c72_img.jpg\)](#)

Main GameDev Geogebra Elektronika Random



Geo-Pac, czyli jak tworzyć gry w GeoGebrze.

Tu znajdziesz materiały z mojej prezentacji na konferencji EWCOME2017(East - West Conference on Mathematics Education) [czytaj dalej »](#)

18:00, 24.08.2017 | Tagi: EWCOME2017 >

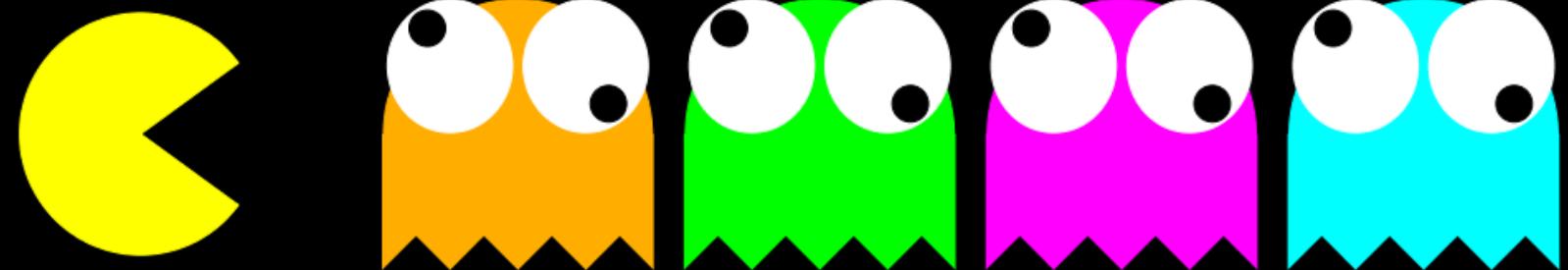


EWCOME 2017 - abstrakty

Abstrakty na konferencje EWCOME2017(East - West Conference on Mathematics Education) są już gotowe i zaakceptowane. Zachęcam do lektury. [czytaj dalej »](#)

12:00, 22.07.2017 | Tagi: EWCOME2017 >

Geo-Pac



Pac-Man in GeoGebra

File: GeoPac v3.2 final.ggb

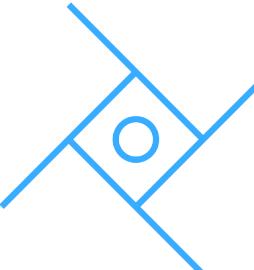


About Geo-Pac project

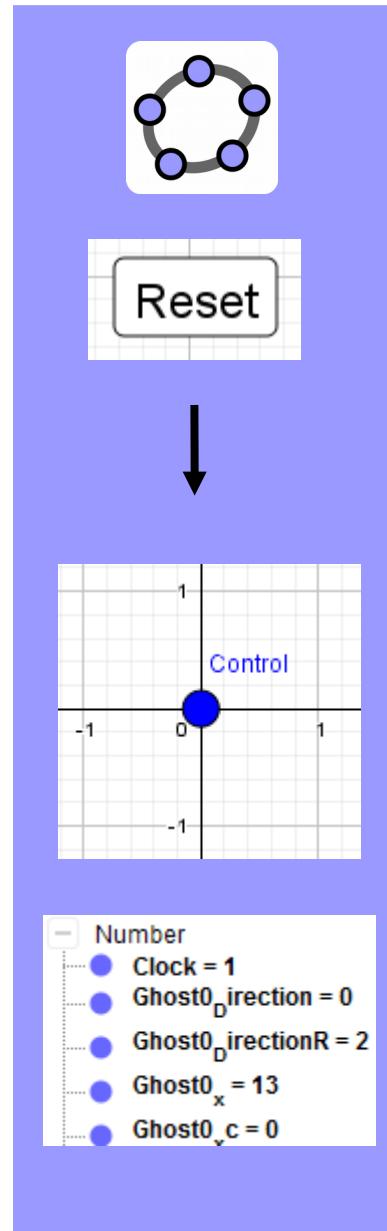
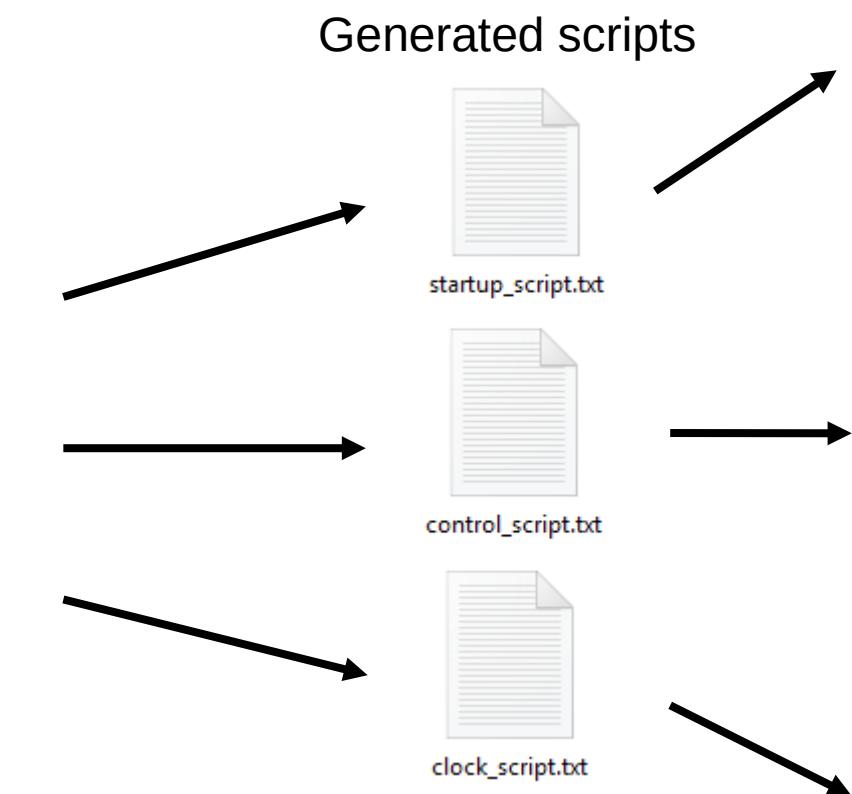
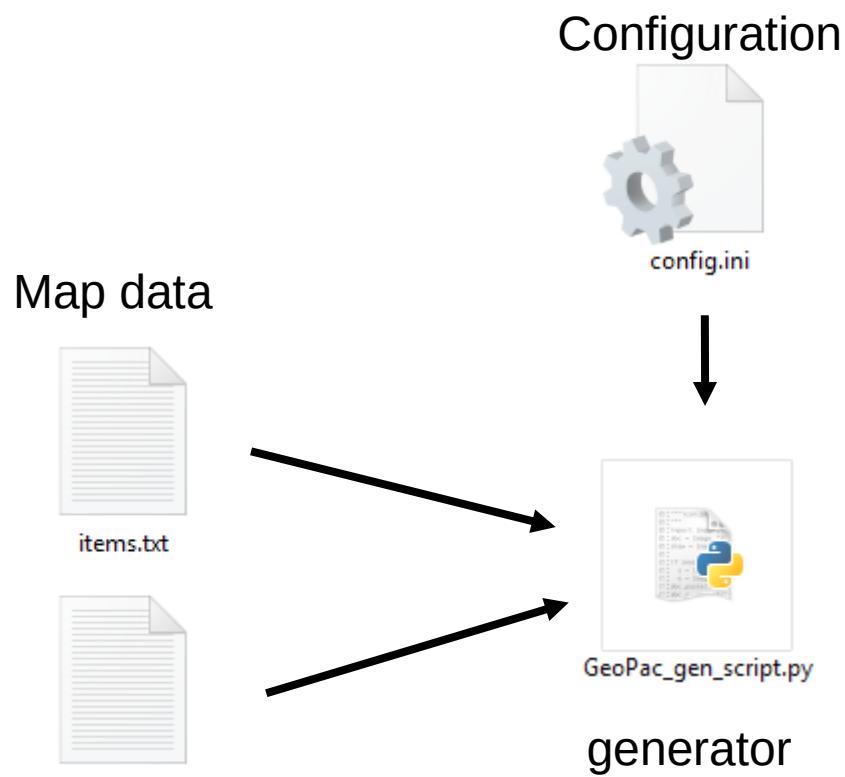
Geo-Pac project is a implementation of an iconic game Pac-Man in GeoGebra.

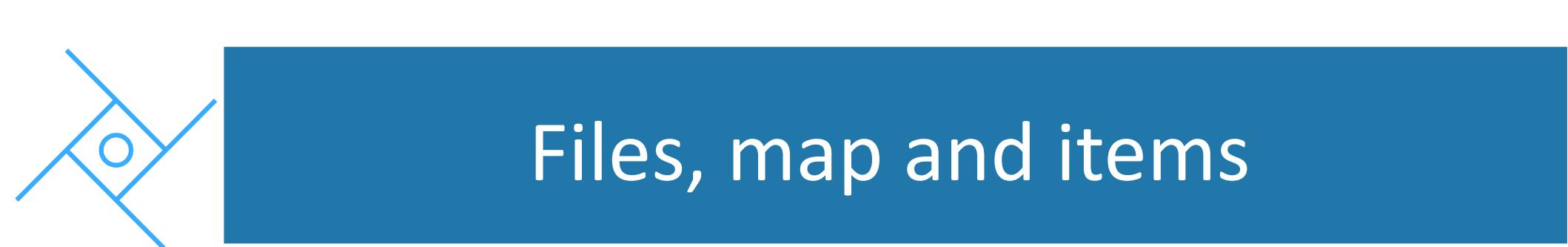
I created first version of Geo-Pac in 2014, but at that time I was lacking skills required to build good game mechanics. I abandoned project.

I resumed work on the project after I had heard about countrywide competition Matematyka & GeoGebra MaGIK. My work was outstanding in Art category at this competition.



How to make Pac-Man?





Files, map and items

Files, map.txt, items.txt and config.ini are required by generator. They contain information about map shape, items and colors.

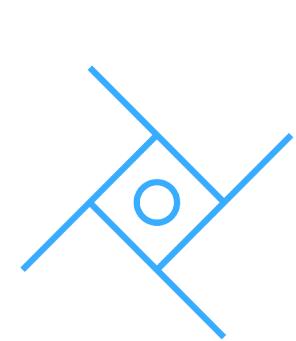
```
XXXXXXXXXXXXXX  
XXXXXXXXXXXXXX  
SCCCCCCCCCCSXX  
CXXXXXCCCCXX  
CXXXXXCCCCXX  
CXXXXXCCCCXX  
CCCCCCCCCCCCXX  
XXXCCXCCCCXX  
XXXCCXCCCCXX  
CCCCXXCCCCSXX  
CXXXXXCCCCXXXX  
PXXXXXCCCCXXXX  
PPPPXXCCCCXXXX  
XXXPXXCCCCXXXX  
XXXPXXCCCCXXXX  
RXXRXXCCCCXXXX
```



```
XXXXXXXXXXXXXX  
X000000000000  
X000000000000  
X00XX00XXXX0  
X00XX00XXXX0  
X000000000000  
X000000000000  
X00XX00X00XX  
X0000000X0000  
X0000000X0000  
XXXXXX00XXXX0  
XXXXXX00X00000  
XXXXXX00X00000  
XXXXXX00X00XX  
XXXXXX00X00X00  
XXXXXX00X00X00
```

The diagram illustrates the dependencies between files. Three icons representing items.txt, config.ini, and map.txt are positioned above a large downward-pointing arrow. This arrow points to a code block labeled [FILES]. The code block contains configuration settings for the generator, including the paths to the three files.

```
[FILES]
map_file= map.txt
items_file= items.txt
startup_script_file= startup_script.txt
clock_script_file= clock_script.txt
```



Game generator

Generator is written in Python3.

Generator creates files for GeoGebra based on files, map.txt, items.txt and config.ini.

```
#Items pusher START
coin_color = hex_to_rgb(config['COLORS']['coin_color'])
super_coin_color = hex_to_rgb(config['COLORS']['super_coin_color'])

coin,teler,telel,x,y = 0,0,0,0,0

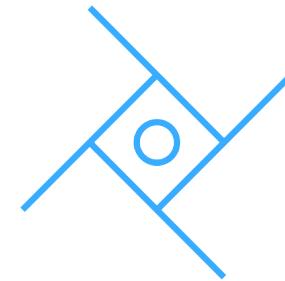
for row in items_table:
    for letter in row:

        if letter == 'C' or letter == 'S':
            startup_file.write('Coin_b'+str(coin)+' = true\n')#create bool
            startup_file.write('Coin'+str(coin)+' = ('+str(x)+','+str(y)+')\n')#create coin
            startup_file.write('SetVisibleInView[ Coin'+str(coin)+',1,false ]\n')
            startup_file.write('coin'+str(coin)+' = Circle[Coin'+str(coin)+', 0.1]\n')#create coin
            startup_file.write('ShowLabel[coin'+str(coin)+', false]\n')#hide coin label
            startup_file.write('SetDynamicColor[ coin'+str(coin)+',' +str(coin_color[0])+',' +str(coin_color[1])+', ' +
            startup_file.write('SetConditionToShowObject[coin'+str(coin)+', Coin_b'+str(coin)+']\n')#create condition
            coin+=1

        x+=1
x=0
y+=1
```



Final steps



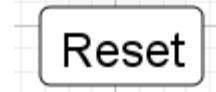
startup_script.txt



control_script.txt



clock_script.txt



1. Add Button
2. Paste text from startup_script.txt to button
 - . . .
3. Click button and wait for script to load map.
4. Paste text from control_script.txt to point named Control in field OnUpdate.
5. Paste text from clock_script.txt to number named Clock in field OnUpdate.
6. Pac-Man is ready.

Result

geoewcome.ggb

File Edit View Options Tools Window Help Sign in

Algebra Graphics

Reset

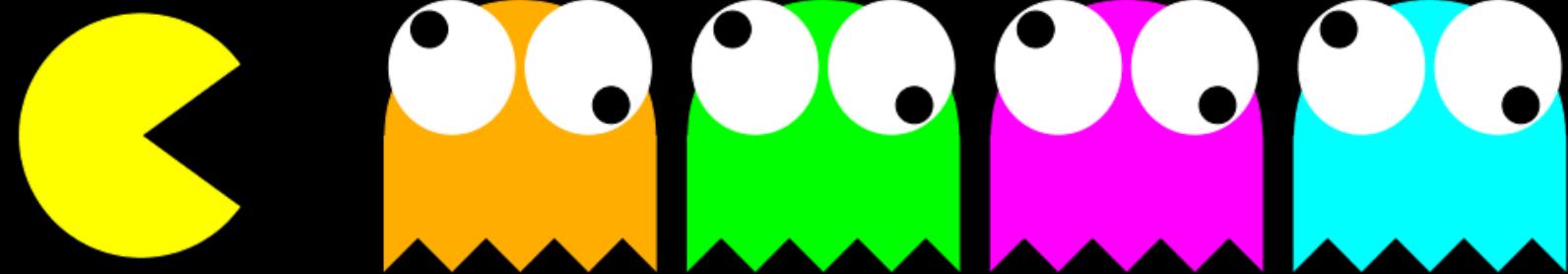
Boolean Value

- Coin_b0 = true
- Coin_b1 = true
- Coin_b10 = true
- Coin_b11 = true
- Coin_b12 = true
- Coin_b13 = true
- Coin_b14 = true
- Coin_b15 = true
- Coin_b16 = true
- Coin_b17 = true
- Coin_b18 = true
- Coin_b19 = true
- Coin_b2 = true
- Coin_b20 = true
- Coin_b21 = true
- Coin_b22 = true
- Coin_b23 = true
- Coin_b24 = true
- Coin_b25 = true
- Coin_b26 = true
- Coin_b27 = true
- Coin_b28 = true
- Coin_b29 = true
- Coin_b3 = true

Graphics View:

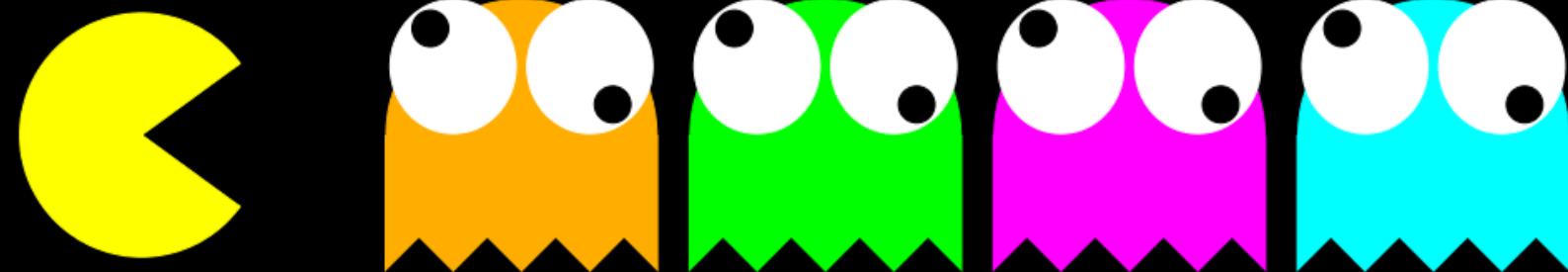
Input:

Making game in GeoGebra



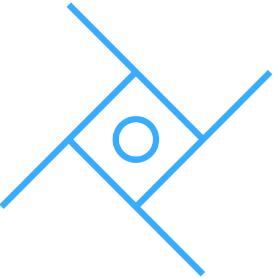
Step 1: Arrow buttons

Example 1



Movement of point

File: Point.ggb



Quick introduction to GeoGebra Script

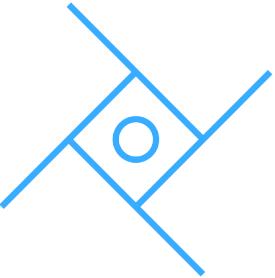
Commands are executed line by line.

SetValue[<Object1>, <Object2>]

Command sets value of <Object1> to value of <Object2>.

x(<Point>) returns x coordinate of point <Point>.

y(<Point>) returns y coordinate of point <Point>.



Quick introduction to GeoGebra Script

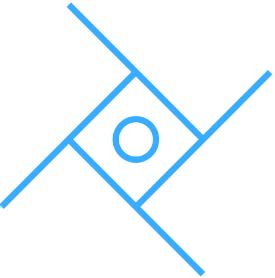
`If[<Condition 1>, <Then 1>, <Else>]`

Command executes statement `<Then 1>`

if `<Condition 1>` is equal true.

If `<Condition 1>` is equal false

statement `<Else>` is executed.



How does it work?

```
Control = (0, 0)
```

```
pos_x = 2
```

```
pos_y = 2
```

```
Pac = (pos_x, pos_y)
```

On Update:

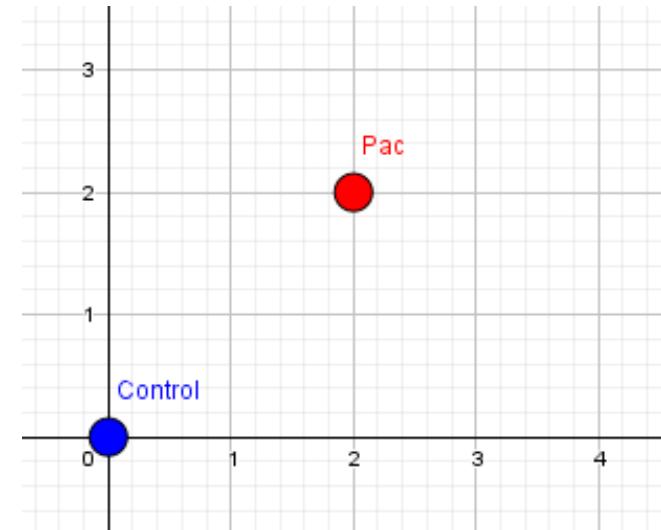
```
If[x(Control)>0, SetValue[pos_x, pos_x+1]]
```

```
If[x(Control)<0, SetValue[pos_x, pos_x-1]]
```

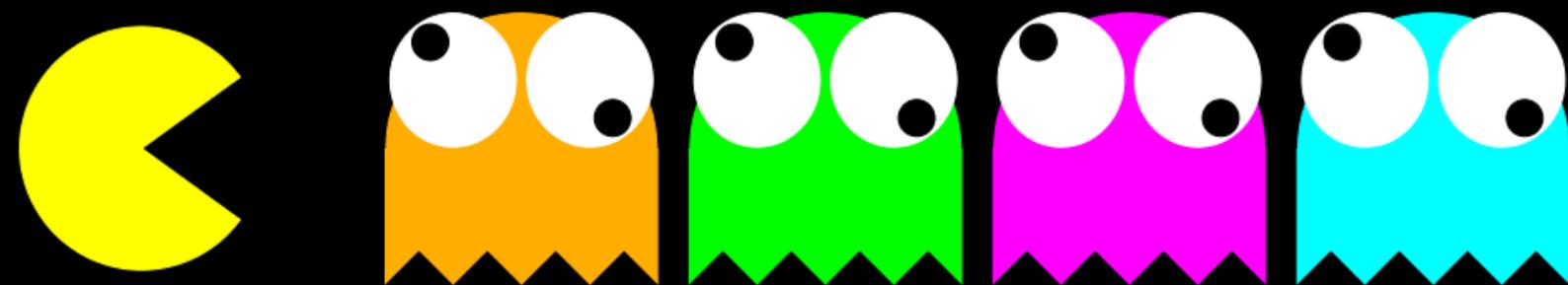
```
If[y(Control)>0, SetValue[pos_y, pos_y+1]]
```

```
If[y(Control)<0, SetValue[pos_y, pos_y-1]]
```

```
SetValue[Control, (0,0)]
```



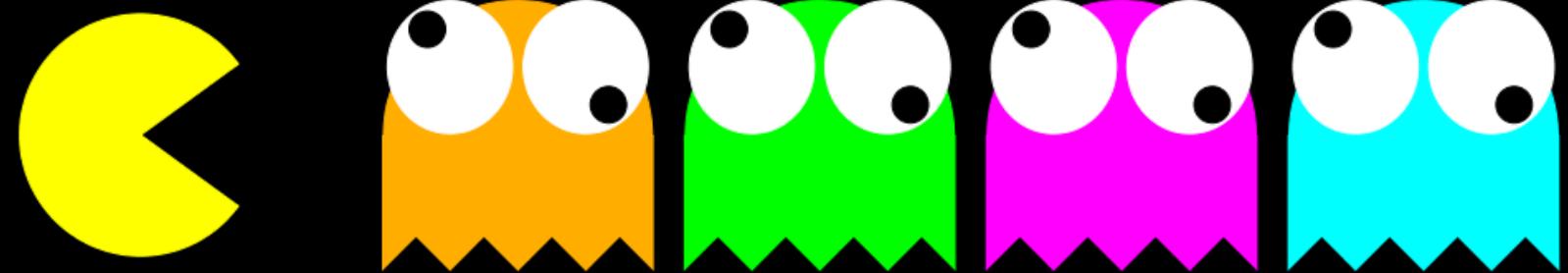
Example 2



Modification of sine function

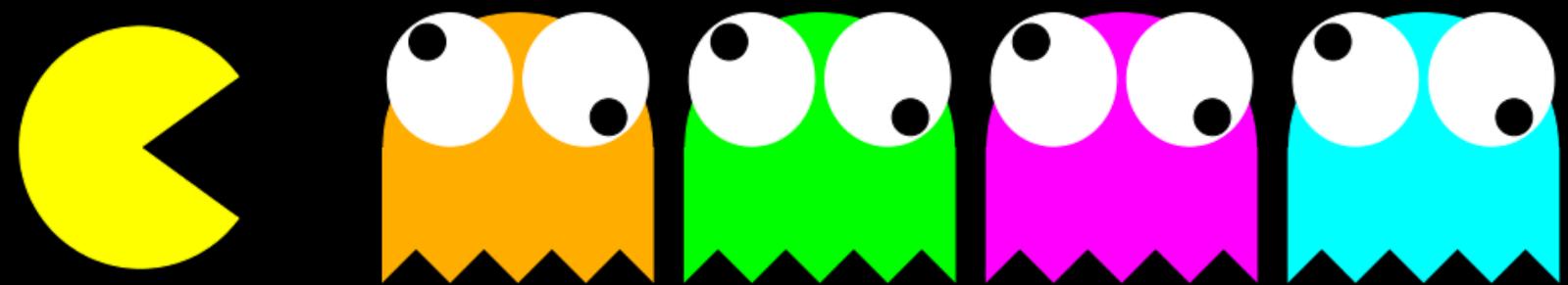
File: Sinus.ggb

Making game in GeoGebra



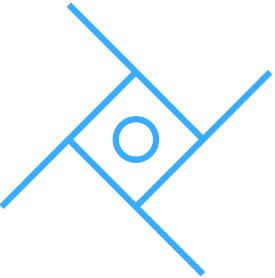
Step 2: „Procedures”

Example 3



Pac-Man animation

File: Pacman animation.ggb



Execute[]

Execute[<List of Texts>, <Parameter>, ... , <Parameter>]

Command replaces %1 for the first parameter, %2 for the second parameter and so on in each text in list.

Up to 9 parameters can be specified. After the replacement, resulting scripts are executed.

Parameters are interpreted as text.

Command names must be in English(us) in the texts for this command to work



Use of Execute[] command

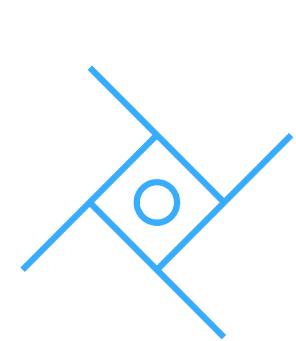
Example:

a = 1

b = 5

Execute[{ „SetValue[%1,%2]”} , a , b]

Result: a=5 , b=5



Use of Execute[] command

Example:

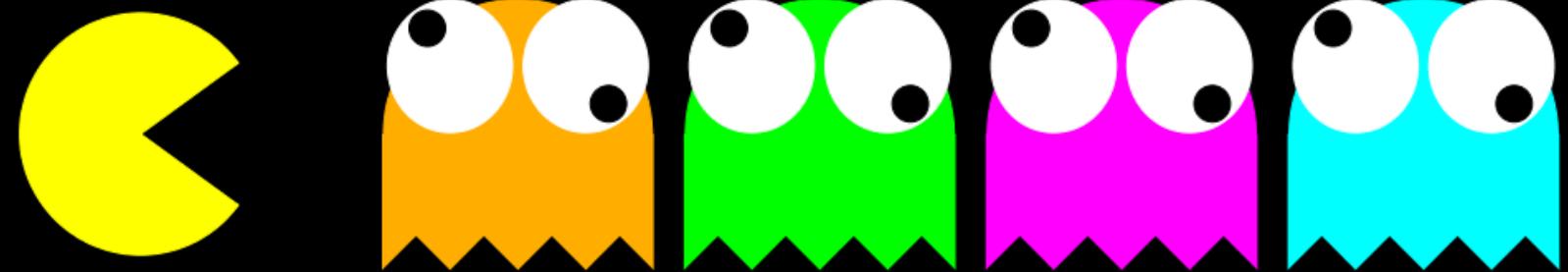
```
a = 1  
b = 5  
c = 0
```

```
command_swap = { „SetValue[c,%1]” ,  
                  „SetValue[%1,%2]” ,  
                  „SetValue[%2,c]” }
```

```
Execute[command_swap,a,b]
```

Result: a=5 , b=1

Example 4



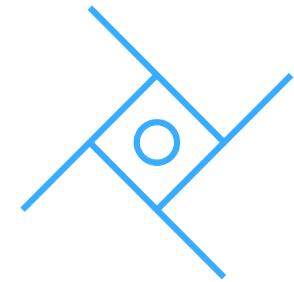
„Procedure”

File: Procedure.ggb

Making game in GeoGebra

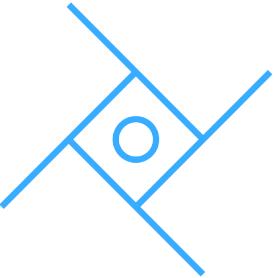


Step 3: „Loops”



Using slider animation as „loop”

- * It works correctly only for small speed animations.
- ✓ It does not interrupt GeoGebra while running.
- ✓ It can be run infinitely.

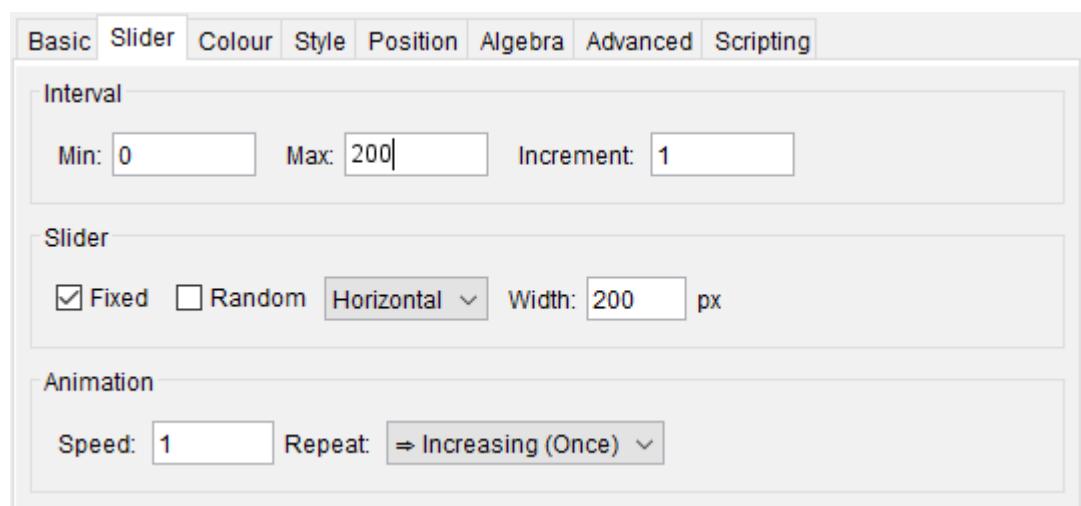


Creating slider

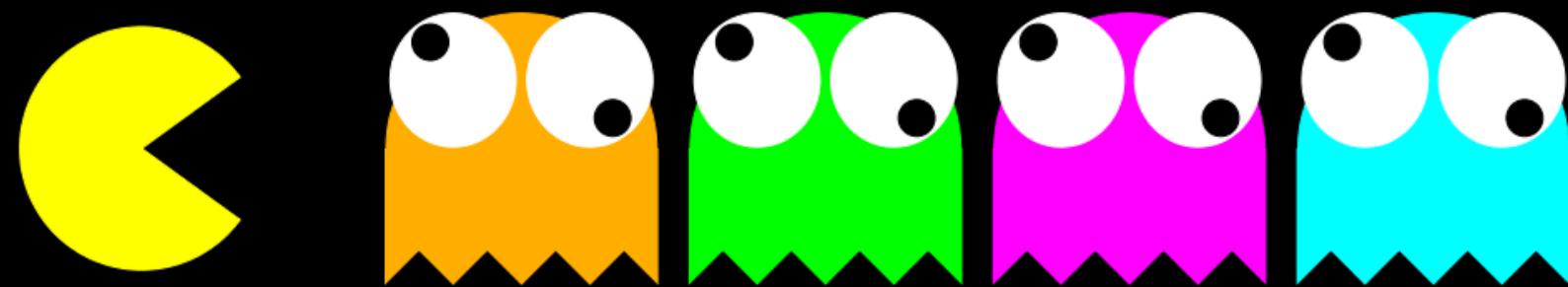
Slider runs 200 times and it takes 10s.

On Update:

SetValue[A, A + (0, 0)] (example command)



Example 5



Character animation

File: Character animation.ggb



Use of RunUpdateScript[] command

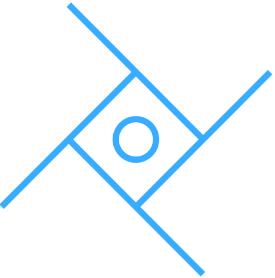
RunUpdateScript[<Object>]

Runs the update script associated with the <Object> (if it has one).



Using RunUpdateScript[] as „Loop”

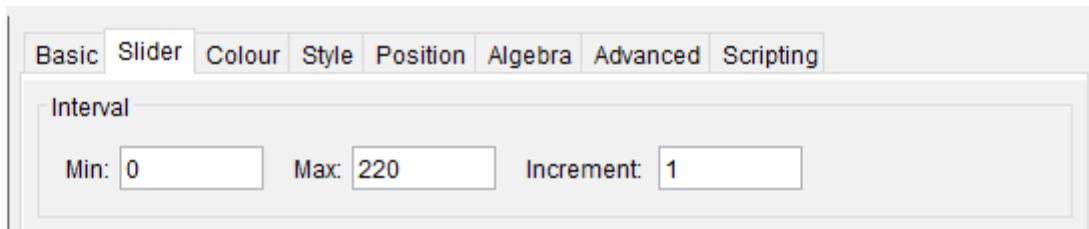
- ✓ Quickest possible method for loops.
- ✗ It freezes GeoGebra while commands are executed.
- ✗ Scripts cannot be run more than 190 times, because error is appearing.
- ✗ It may crash GeoGebra.



RunUpdateScript[]

Script runs 190 times.

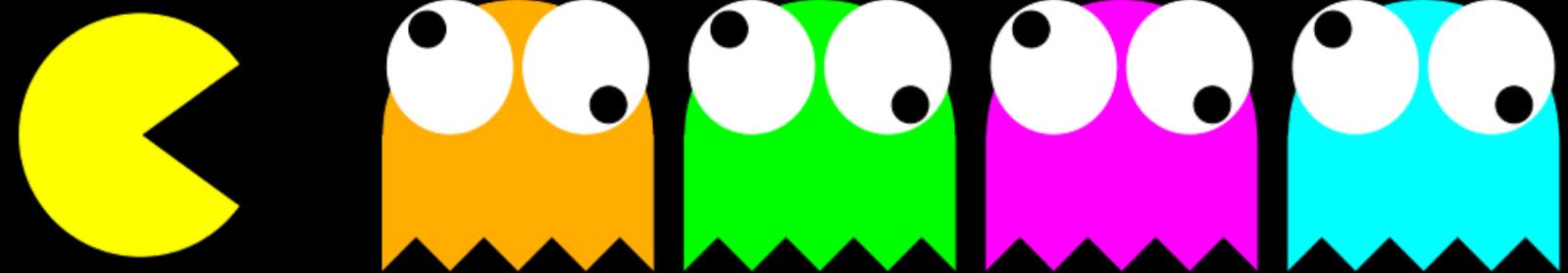
Command that limits number of runs is required.



On Update:

SetValue[A, A + (1, 0)] (example command)
If[Loop < 190, RunUpdateScript[Loop]]

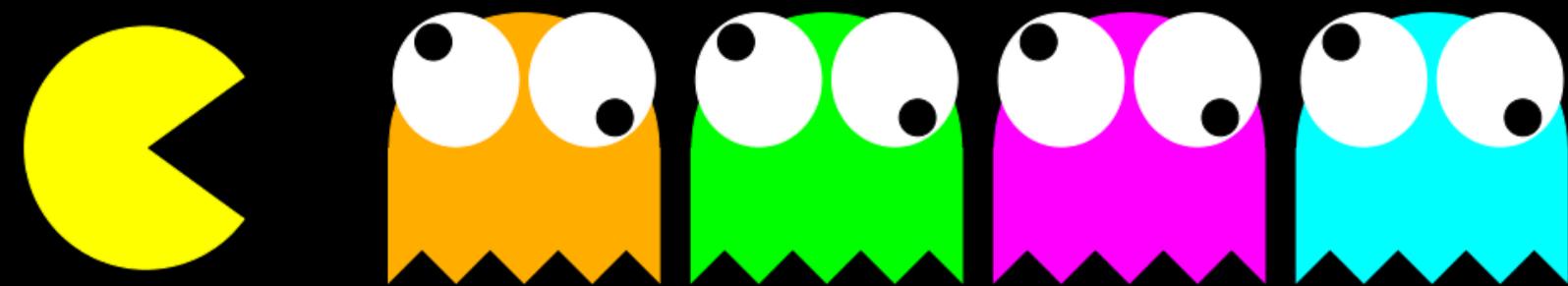
Example 6



„Loops”

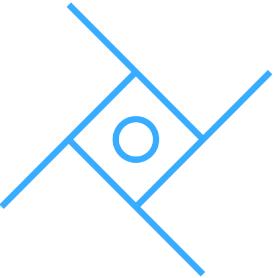
File: Loops.ggb

Making game in GeoGebra



Result: Simple platform based game

File: Platform.ggb



Thank you for your attention



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linkedin.com
[/in/kifner-mateusz](https://www.linkedin.com/in/kifner-mateusz)