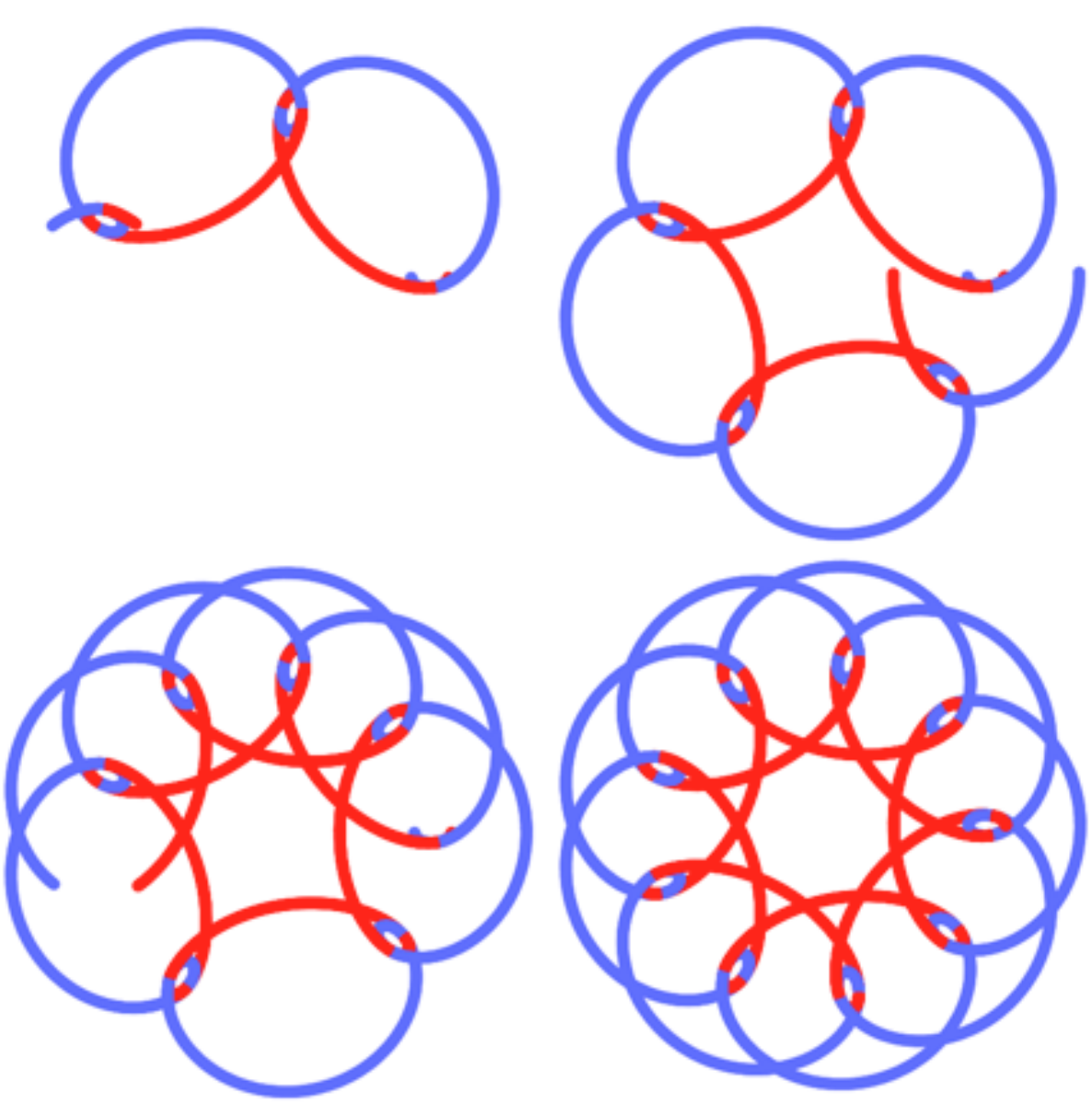
Rolling circles

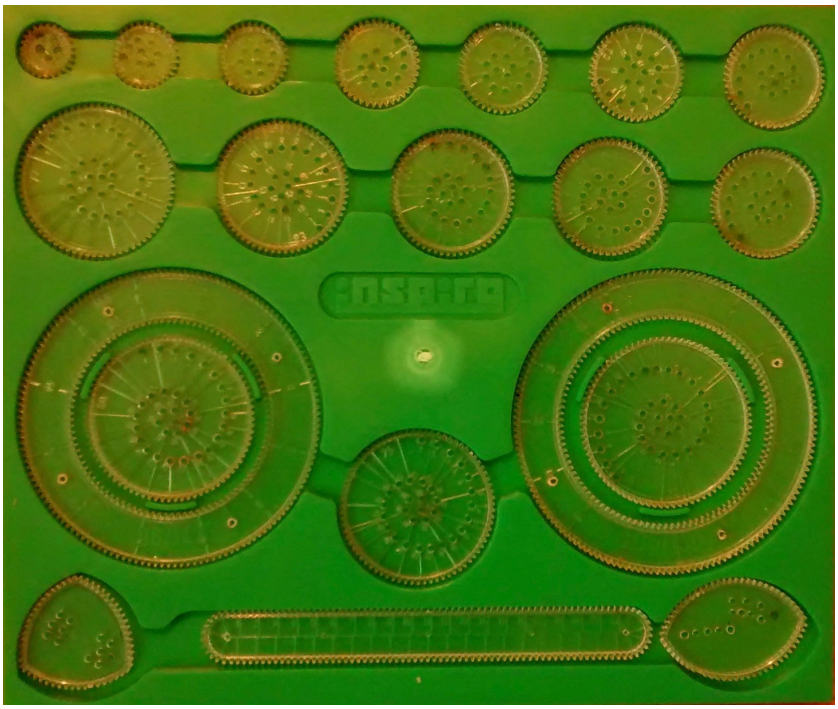
Written by János Losonczi



25, 50, 75, 100 %

1 Antedecent

In the early 1980s I made a journey to Czechoslovakia, where I saw this toy in a shop. At first sight I liked it and bought it for my daughter. At those times my children sometimes played with it, and although I was interested in it, this toy spent decades in cupboards. When I got acquainted with GeoGebra I decided to create an app based on the idea of this toy. As toys like this nowadays are named spirograph, I chose this name *spirograph.ggb*.



2 spirograph.ggb

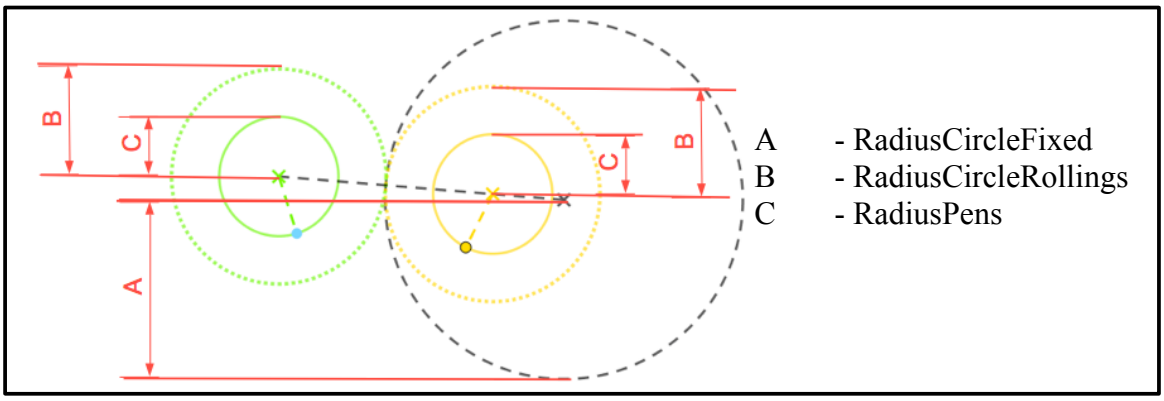
It consists of

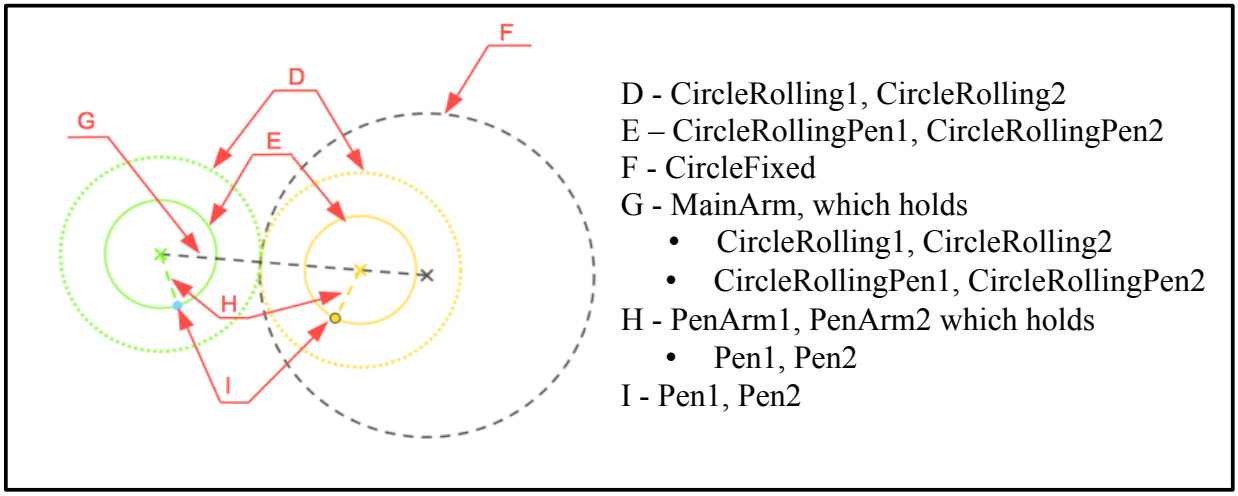
- a “machinery” which may roll a **circle on a line**, or **two circles around a fixed circle**,
- pen(s) which draw(s) its / their track(s),
- parametric curves of cycloids (epicycloid, epitrochoid, hypocycloid and hypotrochoid).

This app may recognize contracted, common and prolate cycloids.

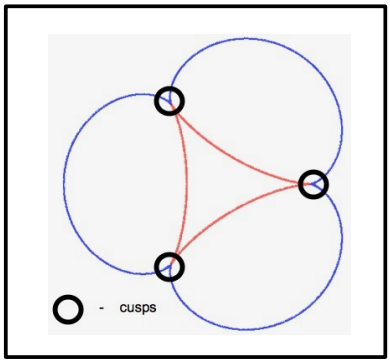
3 What is what (rolling circles around a circle)?

3.1 Machinery



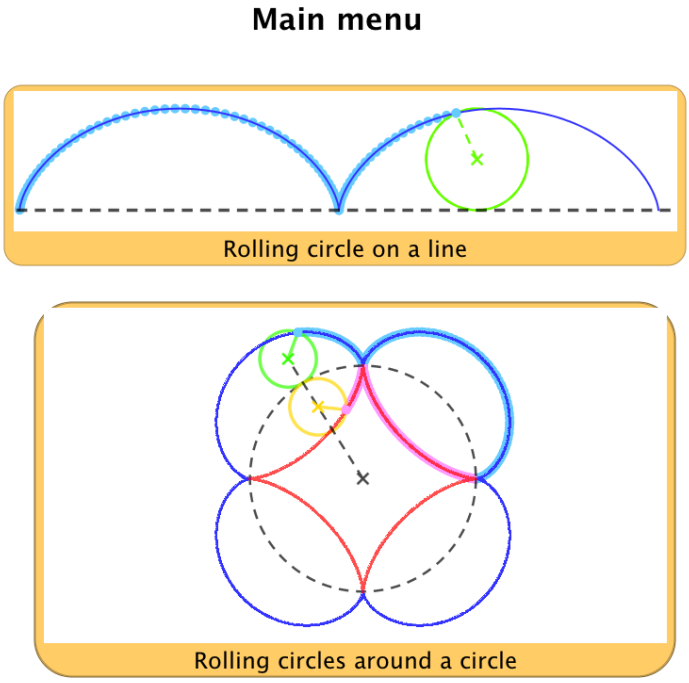


3.2 Curves and cusps

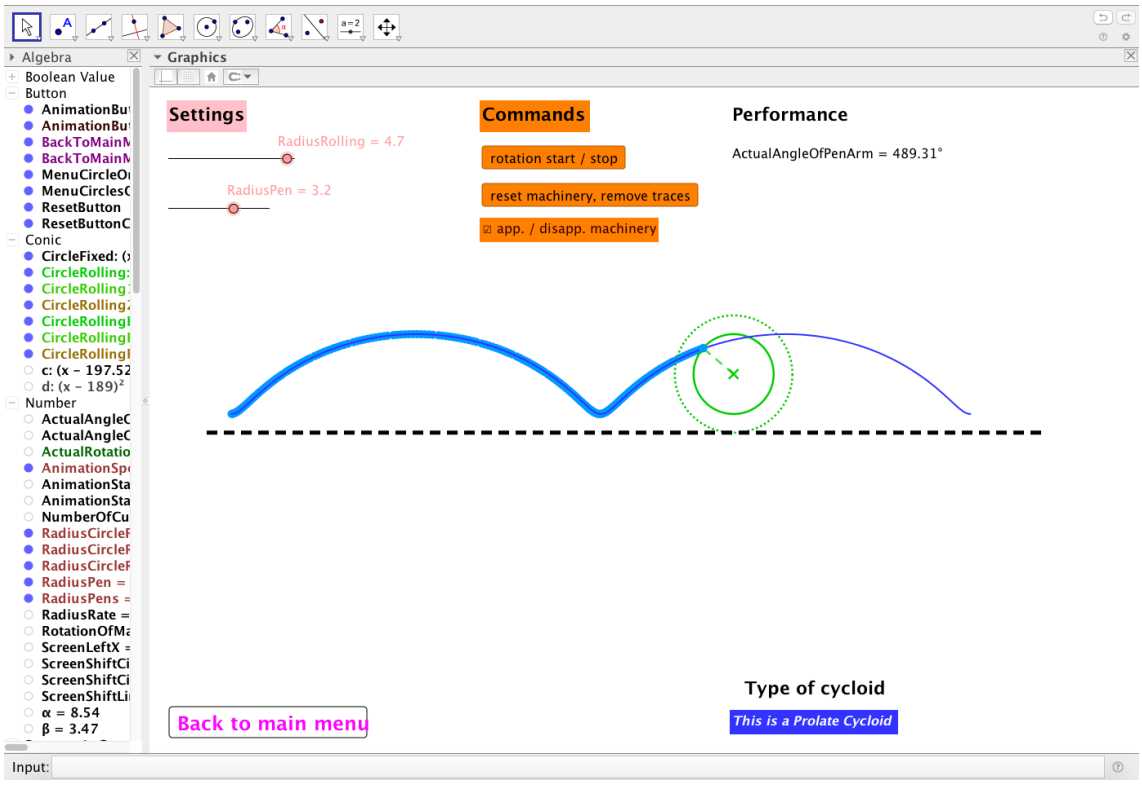


4 Menu structure

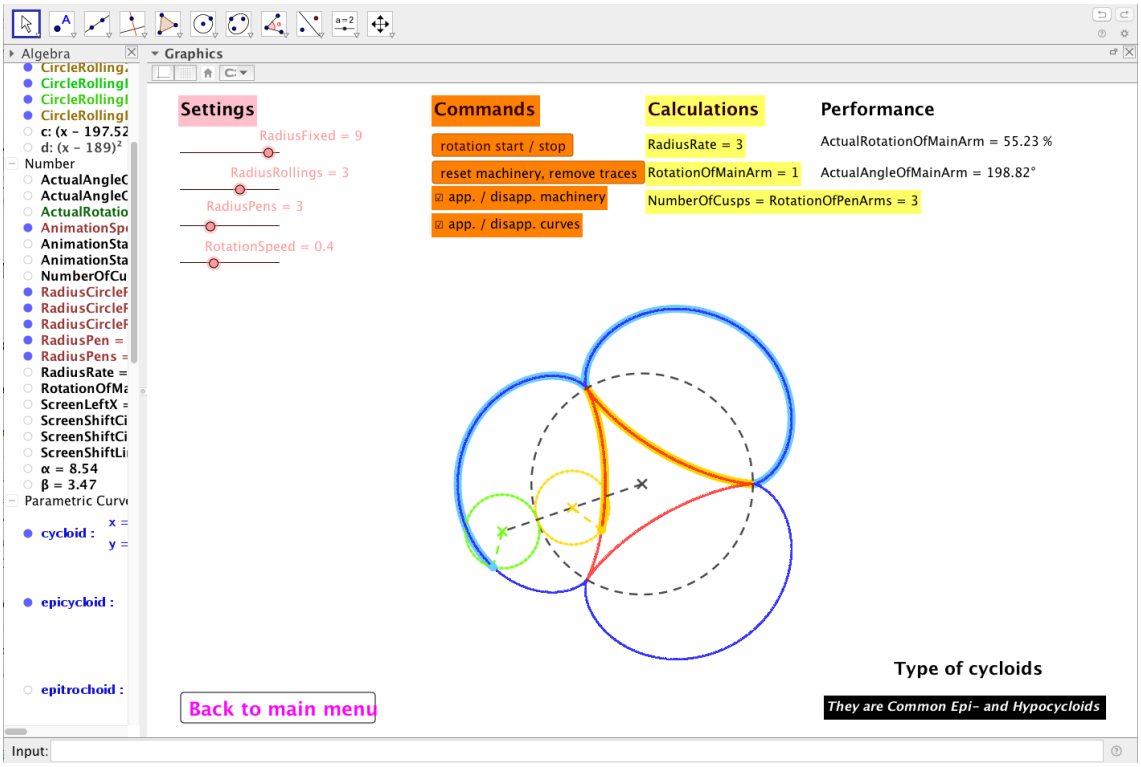
4.1 Main menu



4.2 Rolling circle on a line



4.3 Rolling circles around a circle



5 Main blocks on the screens

5.1 Rolling circle on a line

- Settings
  - radiuses
- Commands
  - rotation start / stop (start / stop (suspend))
  - reset machinery, remove traces (it is needed before starting a new rotation)
  - app. / disapp. machinery (appear / disappear)
- Performance
  - ActualAngleOfPenArm
- Machinery, curve, etc.
  - Moving of the pen is traced. The track of the pen may be comparable with the curve by the help of tracing
- Recognized cycloids
  - contracted, common, prolate
- Back to main menu
  - switching between line-, and circle screens can be done through *Main menu*

5.2 Rolling circles around a circle

- Settings
  - radiuses and
  - rotation speed can be set
- Commands
  - rotation start / stop (start / stop (suspend))
  - reset machinery, remove traces (it is needed before starting a new rotation)
  - app. / disapp. machinery (appear / disappear)
  - app. / disapp. curves
- Calculations
  - RadiusRate
  - RotationOfMainArm
  - NumberOfCusps, RotationOfPenArms
- Performance
  - ActualRotationOfMainArm
  - ActualAngleOfMainArm
- Machinery, curves, etc.
  - Moving of the pens are traced. The tracks of the pens may be comparable with the curves by the help of tracing
- Recognized cycloids
  - contracted- , common- , prolate- epicycloid, epitrochoid, hypocycloid, hypotrochoid
- Back to main menu
  - switching between line-, and circle screens can be done through *Main menu*

6 How to use it?

6.1 Chose from Main menu

- *Rolling circle on a line*
- *Rolling circles around a circle*

6.2 Begin a new rotation

- set radiuses (fixed, rolling(s), pen(s))
- check the value of *ActualAngleOfPenArm*, or *ActualAngleOfMainArm* whether it is 0°. If not, use: *reset machinery, remove traces*
- *rotation start / stop*
- set *RotationSpeed* (only on *circles on circle* screen) if it is desirable

6.3 Resume a suspended rotation

- *rotation start / stop*
- set *RotationSpeed* (only on *circles on circle* screen) if it is desirable

6.4 Appear, disappear machinery, curves

Sometimes it may be disturbing to see both machinery and curves simultaneously. In this case use:

- app./ disapp. machinery, or
- app. / disapp. curves

6.5 Switch between screens

- switching between line-, and circle screens can be done through *Main menu*