FIBONACCI TURBINE
and
Cone-puter for Cone-tinued fraction by Cone-pass

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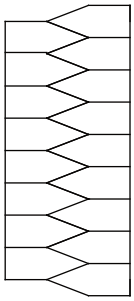
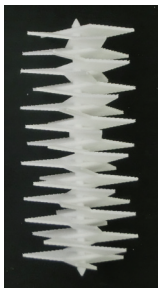
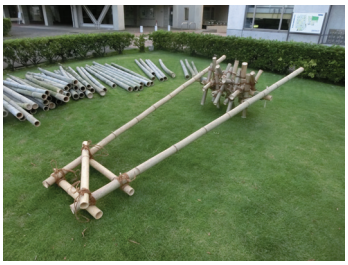
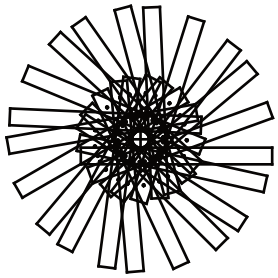
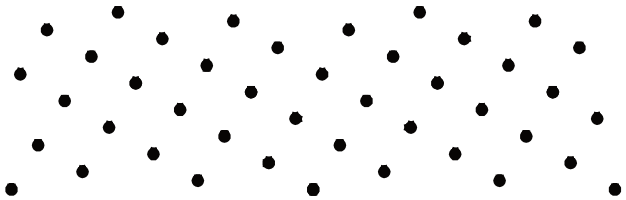




FIBONACCI TURBINE and FIBONACCI HELICOPTER

Just after G4G13 (2018), I invented the ORIGAMI Fibonacci Turbine (Patent No. 7013094)[1].
I have been working with the Phyllotaxis (Golden Angle) for 30 years, and this is my latest work.
It is easy to make like ORIGAMI. There is no shaft, so there is no weak. Any blade is not on the same plane, the loss of lift is low.
The actual spin and flight can be seen below.
https://youtu.be/8naOjOPWK5Q

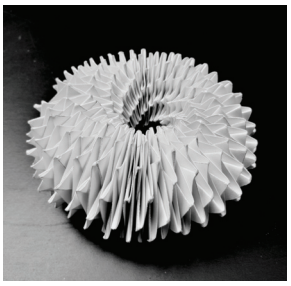
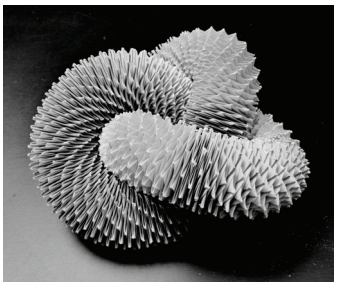





FIBONACCI WHEEL

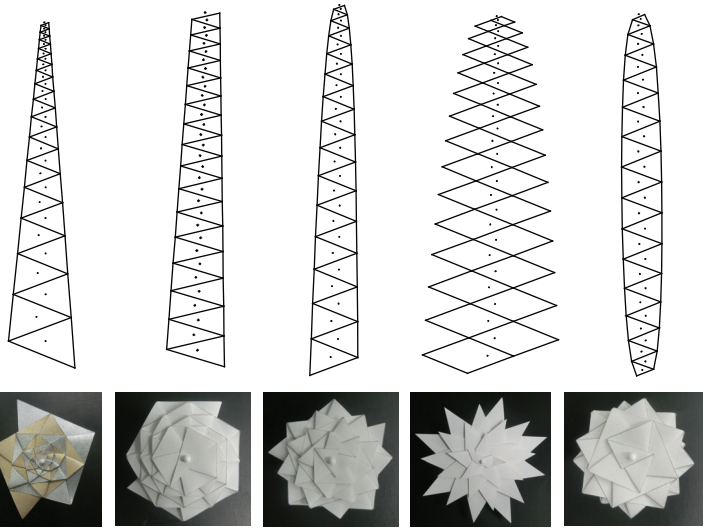
I made the Fibonacci Turbine of bamboo.
It rolls well without circular tyres.
I name it as Bamboo Fibonacci Wheel.
https://youtu.be/4wc0qpLRuH8

The wheel's footprint can be used as a musical score to play four different types of music related to quasiperiodic music.
https://youtu.be/8-kWbufOPsg

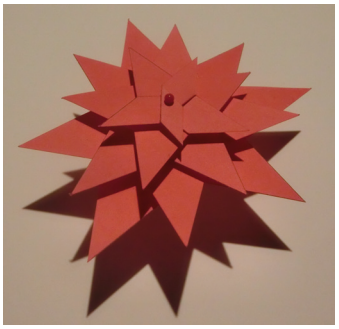
FIBONACCI TORUS and KNOT (2019)

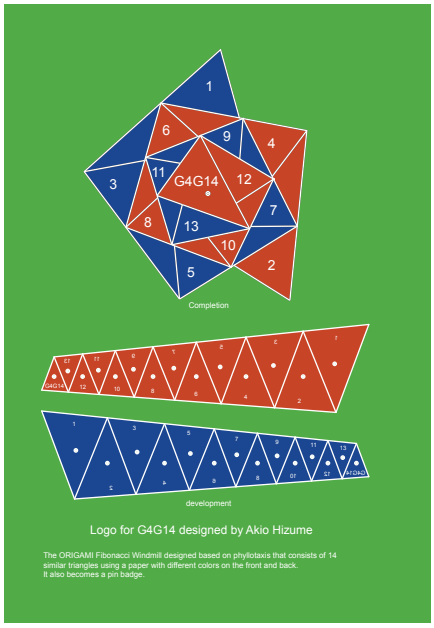
Make long Origami Fibonacci Turbine and join the ends to form torus or knots.
They have a very unique rotational movement.
https://youtu.be/LdnvxN4UUfs



GENERALIZED FIBONACCI TURBINE

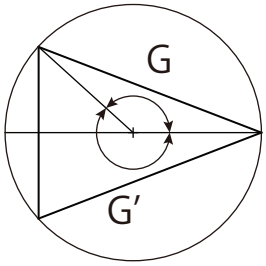
Origami Fibonacci Turbine can be transformed into any curved surface, including cone, parabola, catenary, hyperbola and ellipse, etc...
In addition, turbines other than golden angle can be freely designed based on any real number of its continued fraction.
In particular, the use of parabola Fibonacci Turbine reproduces plant petals excellently.



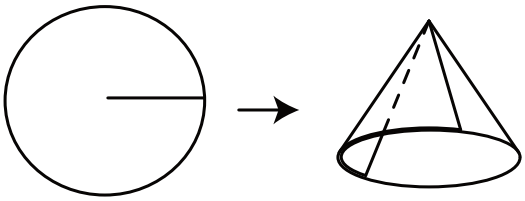
These are some variations of the Fibonacci Turbine.
They are distributed as my G4G14 Exchange Gift.
This pin badge is reversible.

Golden Angle isosceles triangle



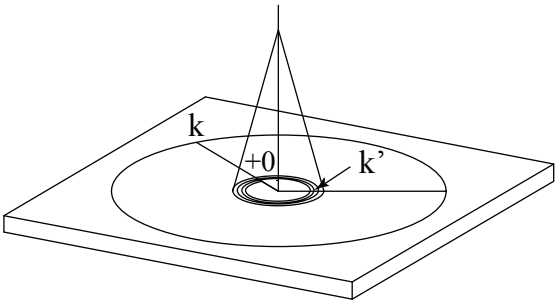
$$\mathrm{G} = 2\pi(2-\tau)$$
$$\mathrm{G}' = 2\pi(\tau-1)$$
$$\tau = \frac{1+\sqrt{5}}{2}$$

Cone-pass



CONE-PUTER for CONE-TINUED FRACTION by CONE-PASS

The basic figure composing the Fibonacci Turbine is the Golden Angle isosceles triangle.
It is impossible to construct the Golden Angle using only a ruler and compass, and it has been a long-standing question how plants acquire the Golden Angle.
In 2020, I found that the Golden Angle could be constructed exactly by the operation of making a cone from a circle with a slit in it, which I named the "Cone-pass" as a new tool for construction[2].
In 2022, it was found that this method can be used to construct not only Golden Angle, but also any real number of angles.
It was also found that the method is closely related to continued fraction.
The preprint saved to Reseachgate[3] will be published in the G4G14 Exchange Book.



$$x_{k+1} = \frac{b}{a + x_k}$$

$$x_\infty = \cfrac{b}{a + \cfrac{b}{a + \cfrac{b}{a + \cfrac{b}{a + \cdots}}}}$$

$[\bar{a}]_b$ continued fractions
Cone-tinued fractions

REFERENCES

[1] Akio Hizume "Origami Fibonacci Turbine," 11th Congress and Exhibition of SIS (2019) .
https://www.researchgate.net/publication/342344343_ORIGAMI_FIBONACCI_TURBINE
[2] Akio Hizume "Cone-Pass, how to construct the Golden Angle", Bulletin of Musashino Art University no.51 (2021 in Japanse)
https://drive.google.com/file/d/1U_XbO16dL2GpqtE30FtsX9Skq8A-yQHR/view
[3] Akio Hizume "Generalization of Cone-pass and Continued Fraction : Cone-puter," Preprint, Researchgate (2022).
https://www.researchgate.net/publication/359045811_Generalization_of_Cone-pass_and_Continued_Fraction_Cone-puter_revised