

# NEXT ENGINEERS

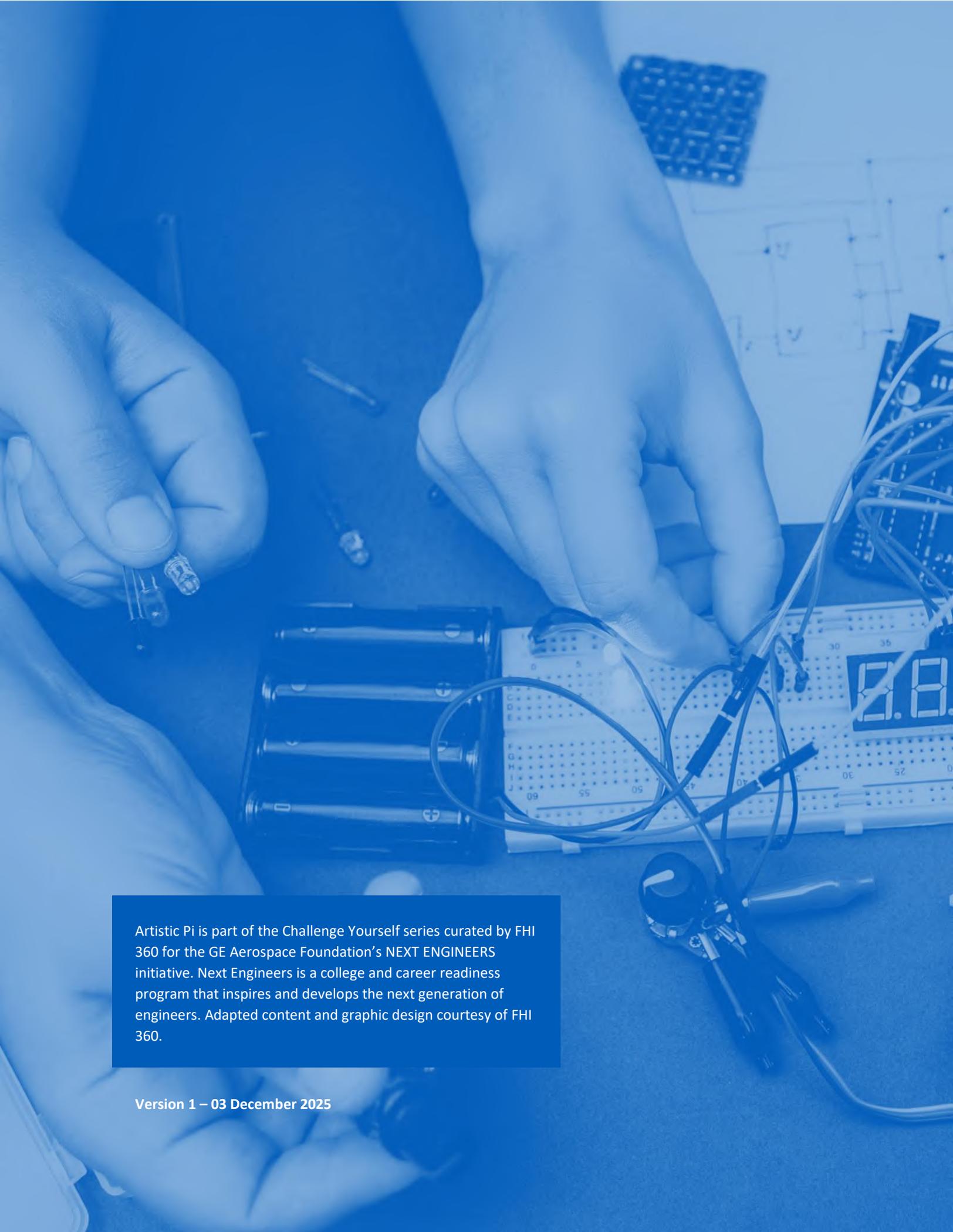


CHALLENGE YOURSELF

Pi Day:  
Artistic Pi  
All Engineering



NEXT ENGINEERS



Artistic Pi is part of the Challenge Yourself series curated by FHI 360 for the GE Aerospace Foundation's NEXT ENGINEERS initiative. Next Engineers is a college and career readiness program that inspires and develops the next generation of engineers. Adapted content and graphic design courtesy of FHI 360.

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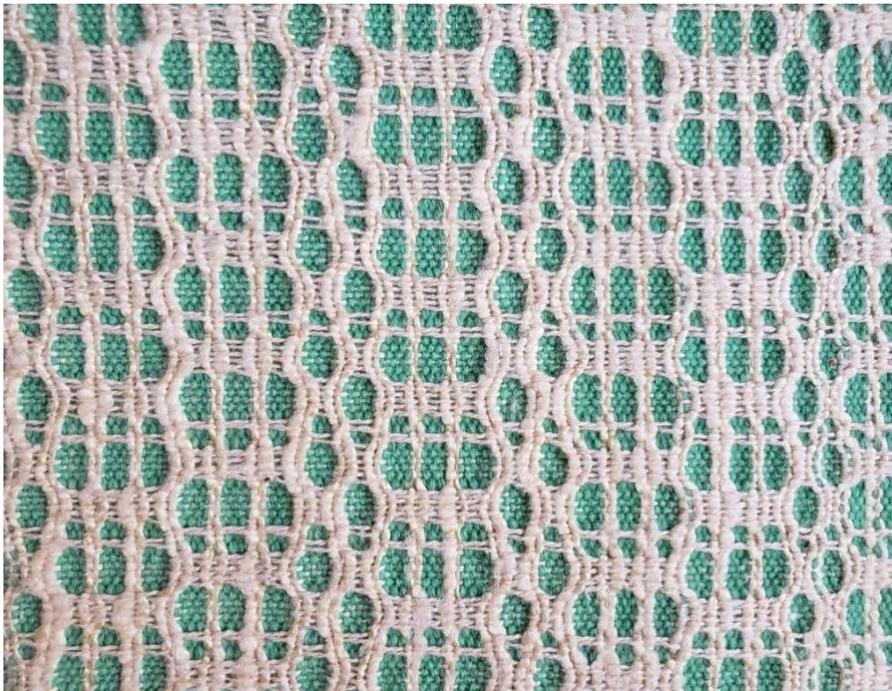
## Artistic Pi

### NERD OUT

#### Mathematical art and artistic mathematics

Like music, there are some deep connections between art and mathematics. Both disciplines require spatial reasoning skills and the ability to recognize patterns.

Mathematics itself has been described as an art motivated by beauty and many prominent artists throughout history have been mathematicians as well or have explicitly used mathematics in the creation of their art. These include Leonardo da Vinci, Wassily Kandinsky and, more recently, M. C. Escher and Ada Dietz.



An example of a weaving pattern based on algebraic expressions designed by Ada Dietz

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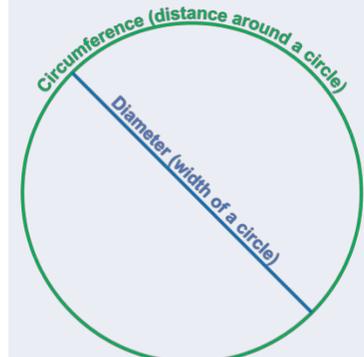
<https://www.forbes.com/sites/chaddscott/2022/03/13/folk-art-fine-art-and-fabric-come-together-in-louisville>

But it is not just famous painters who were inspired by mathematics. Mathematics can be seen in art and architecture from around the world.



#### WHAT IS PI?

Pi (represented by the symbol  $\pi$ ) is the ratio of the length of a circle's circumference to its diameter and has a value of approximately 3.14.



$$\pi = \frac{\text{Circumference}}{\text{Diameter}} \approx 3.14$$



#### LEARN MORE

For a fascinating look at the relationship between mathematics and various fiber arts like quilting, knitting, crocheting, and weaving, visit [Mathematics and fiber arts](https://www.wikiwand.com/en/Mathematics_and_fiber_arts) ([https://www.wikiwand.com/en/Mathematics\\_and\\_fiber\\_arts](https://www.wikiwand.com/en/Mathematics_and_fiber_arts)).





*The art of the Southern African Ndebele tribe is famous for its use of geometric designs and mathematical symmetry*  
*Ndebele House, Bothsabelo Mission, Middelburg District is released under a CC-BY-SA 3.0 license*  
[https://commons.wikimedia.org/wiki/File:Ndebele\\_House,\\_Bothsabelo\\_Mission,\\_Middelburg\\_District.JPG](https://commons.wikimedia.org/wiki/File:Ndebele_House,_Bothsabelo_Mission,_Middelburg_District.JPG)



*A mural in the Alhambra or Red Castle in Granada, Spain, depicts detailed mathematical tessellations*  
*Tassellatura Alhambra is released under a CC-BY-SA 2.0 license*  
[https://commons.wikimedia.org/wiki/File:Tassellatura\\_alhambra.jpg](https://commons.wikimedia.org/wiki/File:Tassellatura_alhambra.jpg)

Some simple connections between mathematics and art include use of the Golden Ratio, symmetry, perspective, and the Law of Thirds, the general rule of thumb about how to proportion different elements in a painting or photograph.



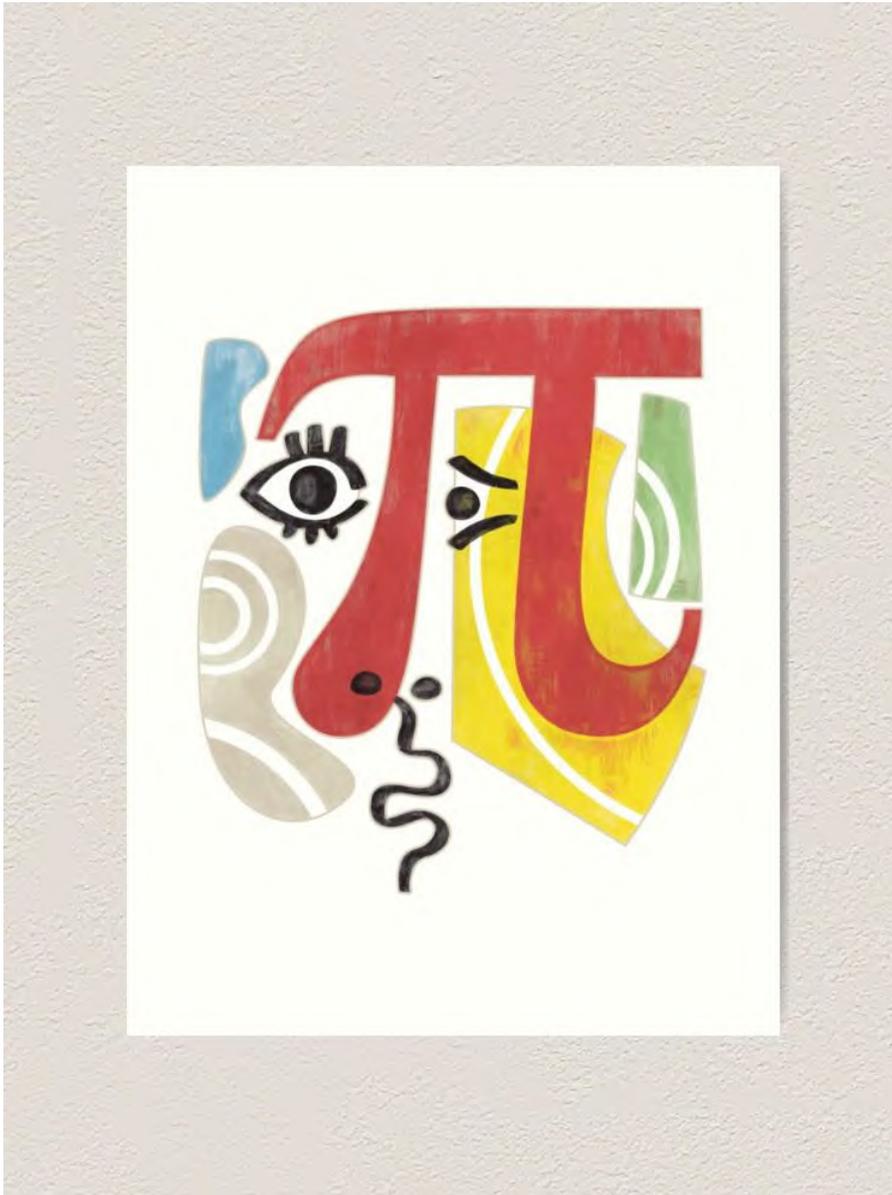
#### LEARN MORE

To learn more about the deep relationship between art and mathematics, read the article *Mathematics and Arts: A Wonderful Marriage* (<https://medium.com/@fantabuloustef/mathematics-and-arts-a-wonderful-marriage-41e8e1e0dcd>). Here you will also find numerous examples or how mathematics and art complement each other.



## The shape of $\pi$

The mathematical constant  $\pi$  (pi) has been used to create some amazing pieces of art. Some of these are more literal depictions of the symbol for pi ( $\pi$ ) while others are visualizations of its digits.

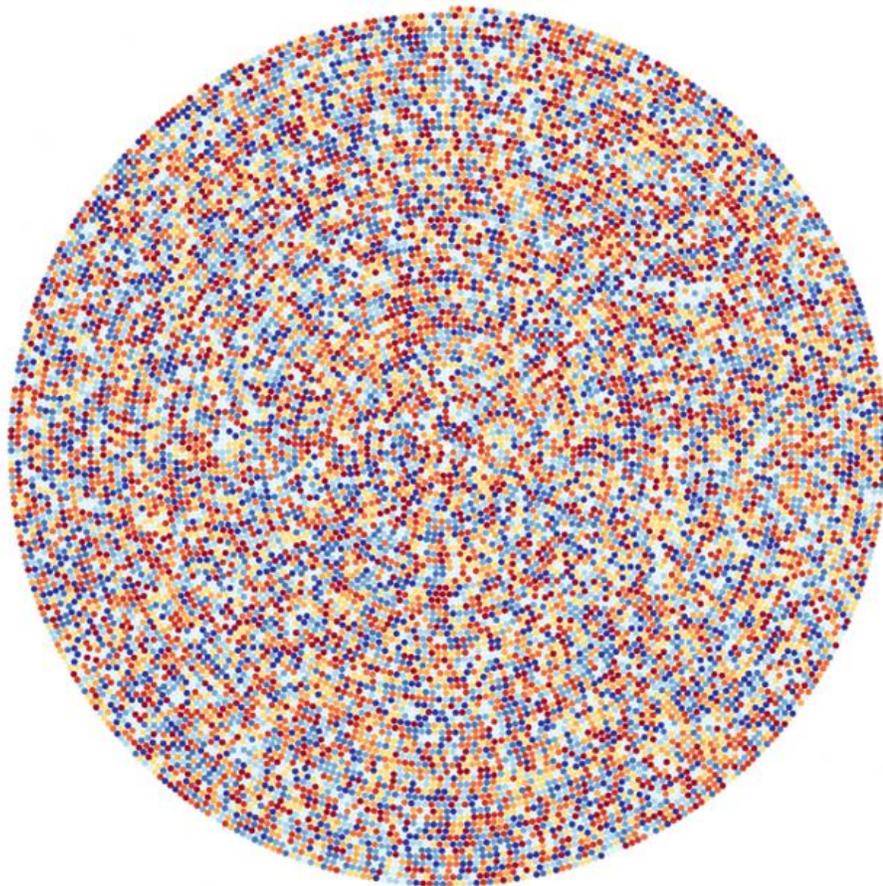


A "Pi-Casso" depiction of the symbol  $\pi$

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<https://www.redbubble.com/i/art-print/Pi-Casso-Pi-Symbol-by-ZapBrand/12117676.1G4ZT>





A visualization of the first 13,688 digits of  $\pi$  spiralled out from the center by Martin Krzywinski  
 Image used under fair use  
<https://www.theguardian.com/science/alexs-adventures-in-numberland/gallery/2014/mar/14/pi-day-pi-transformed-into-incredible-art-in-pictures>

Are you ready to try your hand at creating your own  $\pi$  inspired art? If you need some inspiration, here are two websites that take you into the creative process of some other artists.

- The hidden beauty of Pi (<https://towardsdatascience.com/the-hidden-beauty-of-pi-a694422a0740>)
- The Beauty of Pi ([https://www.flerlagetwins.com/2017/10/the-beauty-of-pi\\_4.html](https://www.flerlagetwins.com/2017/10/the-beauty-of-pi_4.html))

When you are done, share your masterpiece at **#NextEngineersDIY**.



#### LEARN MORE

Learn more about the work of Martin Krzywinski and other pi artists at *Pi Day: pi transformed into incredible art – in pictures*

(<https://www.theguardian.com/science/alexs-adventures-in-numberland/gallery/2014/mar/14/pi-day-pi-transformed-into-incredible-art-in-pictures>).

The video *Pi is Beautiful* (8:23) (<https://www.youtube.com/watch?v=Npoj8lk9Fo4>) also explores Martin's work in more detail.



#### LEARN MORE

Watch the video *Plotting Pi and Searching for Mona Lisa* (9:57)

(<https://www.youtube.com/watch?v=tkC1HHuuk7c>) to see how Matt Hendersen uses the digits of  $\pi$  to make some extraordinary visualizations of  $\pi$ .

