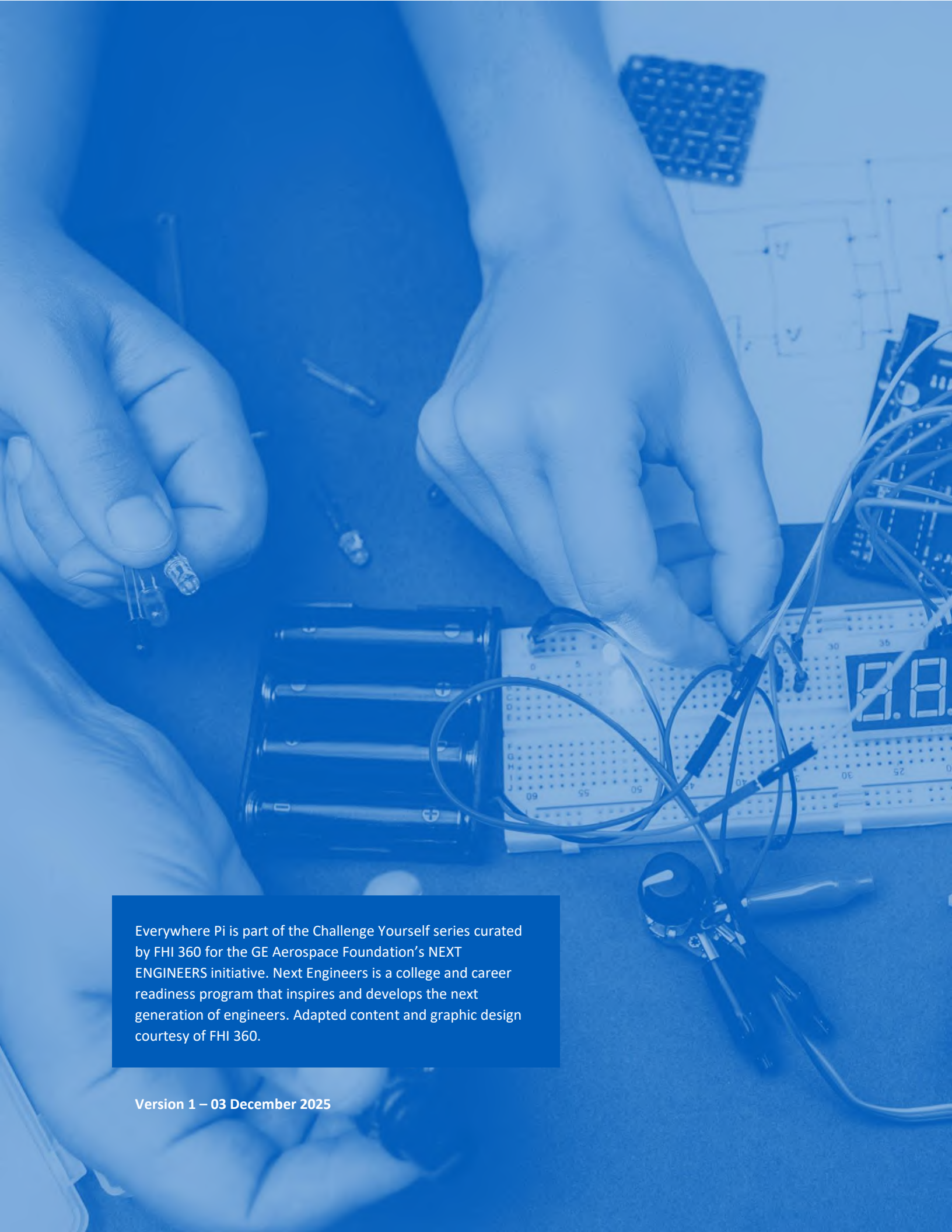
NEXT ENGINEERS

CHALLENGE YOURSELF

Pi Day: Everywhere Pi

All Engineering

NEXT ENGINEERS



Everywhere 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.

Version 1 – 03 December 2025

Everywhere Pi

NERD OUT

Useful pi

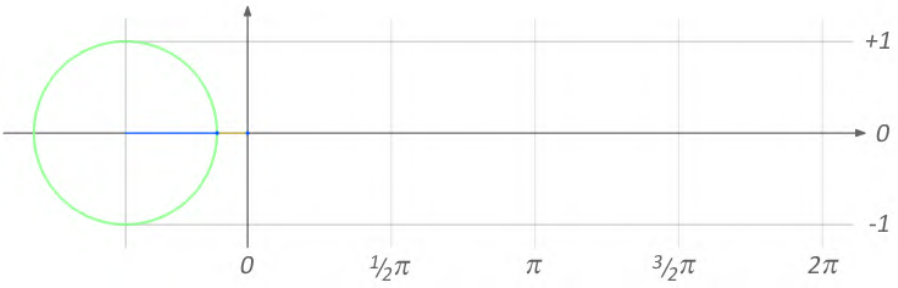
The famous mathematical constant pi (π) is famous for a reason. It is incredibly useful. It is needed anytime one deals with circles, cylinders, or spheres. This does not just include calculating areas and circumferences. It is also needed to calculate circular or angular velocities and accelerations (how quickly things spin and how quickly their rate of spin is changing).

In fact, π is needed when working with curves of many kinds, not just circles, which makes it indispensable to civil and mechanical engineers as well as architects.

Pi underpins the global positioning system (GPS) since the earth is close to a perfect sphere. Indeed, NASA scientists use π all the time when calculating rocket trajectories and orbits.

Electrical engineers rely on π to help them calculate the current and voltage in different electronic circuits containing inductors and capacitors.

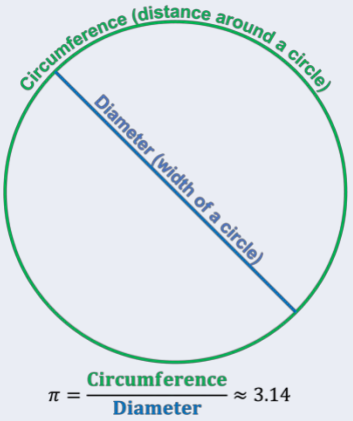
Pi can be used to describe waves of all kinds, from those on a beach to light moving through space. It is also needed to describe the behavior of sub-atomic particles in quantum physics. Physicists at the Large Hadron Collider (LHC) use π all the time, not only because the collider is circular, but also because of the shape of the orbits of electrons and other sub-atomic particles.



This animation shows the relationship between a unit circle and a simple wave
Sine curve drawing animation is released in the public domain
https://commons.wikimedia.org/wiki/File:Sine_curve_drawing_animation.gif

WHAT IS PI?

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



Pi was also initially involved in the calculation of the acceleration due to gravity on earth and the definition of a meter. This involved devising a pendulum that completed a swing every two seconds. Because of this, it turns out that $g \approx \pi^2$.

Five ways NASA uses Pi is used under fair use
https://www.universetoday.com/wp-content/uploads/2014/03/11011.jpg

Playful pi

But π can also be quite playful. It turns up in other less serious but no less surprising ways. Watch the following videos to learn more.

- *A Surprising Pi and 5* (2:36)
  https://www.youtube.com/watch?v=IMY2_yzDm9I
  This video explores how the number 5 and π are related.
- *Pi hiding in prime regularities* (29:42)
  https://www.youtube.com/watch?v=NaL_Cb42WyY
  This is a long and fairly technical video that explores how π turns up in the distribution of prime numbers.
- *The most unexpected answer to a counting puzzle* (5:12)
  https://www.youtube.com/watch?v=HEfHFsfGXjs
  This video describes how π turns up in the number of times two sliding blocks collide with each other on a perfect frictionless surface.
- *Why do colliding blocks compute pi?* (15:12)
  https://www.youtube.com/watch?v=jsYwFizhncE
  This video solves the sliding block problem introduced in the video above.
- *Why is pi here? And why is it squared? A geometric answer to the Basel problem* (19:03)
  https://www.youtube.com/watch?v=d-o3eB9sfls
  Euler proved that the infinte sum $1+\frac{1}{4}+\frac{1}{9}+\frac{1}{16}+\frac{1}{25}+\cdots=\frac{\pi^2}{6}$. This video provides a reasonably easy to understand geometric answer to why this is the case.

Surprising pi

What other specific or surprising uses of π can you find? Do some research and share what you find at **#NextEngineersDIY**.