



PLTW Engineering

10-12/Infrared Technology

May 14, 2020



10-12/DE

Lesson: 5/14/2020

Objective/Learning Target: Students will be able to explain infrared energy and how it is used to sense the surrounding environment.



What is infrared energy?

Infrared technology uses infrared energy to sense things within our environment. In order to understand IR we need to review a few key terms.

A wave is an oscillation that transfers energy through space or matter.

Electromagnetic waves are waves that need no medium to transport energy.

Frequency is the number of complete cycles (repetitions) per second of a wave.



What is infrared energy?

Infrared technology uses infrared energy to sense things within our environment.

Electromagnetic waves pass through space.

Infrared, known as **IR**, is beyond the red edge of visible light and extends from a wavelength of 740 nm (0.00003 inches) with a frequency of 400 THz to a wavelength of about 30 cm (12 inches) with a frequency of 3 GHz. Infrared is invisible to human eyes, but people can feel it as heat.



What is infrared energy?

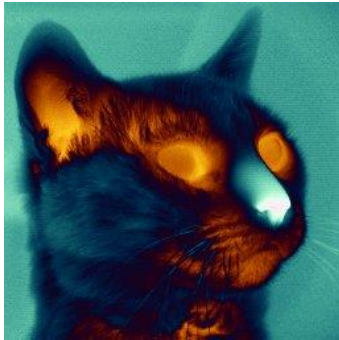
The IR spectrum is useful for purposes of sensing and detecting. All objects, both living and nonliving, give off heat and therefore give off infrared radiation.

All objects have temperatures above absolute zero—a temperature scientists have never be able to reach. Infrared radiation can be detected by electronic circuits.

What is infrared energy?

Special cameras and film can detect differences in temperature, and then assign different brightnesses or false colors to them.

This provides a picture that our eyes can interpret.





What is infrared energy?

Humans may not be able to see infrared light, but snakes in the pit viper family, like rattlesnakes, have sensory "pits", which are used to image infrared light.

This allows the snake to detect warm blooded animals, even in dark burrows.



What is infrared used for?

Tumors are characterized by areas of increased blood flow and metabolism, resulting in areas of temperature increases, making them detectable by IR.

A technology called thermal imaging uses IR to measure body temperatures and has been used to detect diabetes, vascular diseases and cancer.



What is infrared used for?

TVs and stereos, as well as game controllers as well as other devices communicate through IR.

The signal generated by the device is a set of unique pulses that are recognized by the device and cause it to turn on.



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Quiz yourself

1. What part of the electromagnetic spectrum can be used to “see” at night?
2. What are the wavelengths of IR?
3. List four ways scientists and engineers use IR technology to conduct research and design products.
4. Explain how IR technology can be used to find a person lost on a hike.



Helpful links

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