(Approx. 1473 words)

A Conversation with BARD

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Two months ago, I published two related articles in the March Drive Light. The first titled

“What is ChatGPT and why does it matter?” which briefly introduced the chatbot that

had recently been released from OpenAI (https://openai.com/api/ ). That was followed

by an article about a subject with which I am quite familiar as an Electrical Engineer

(BE EECS).

The second article is “What is Electricity? (Hint, the answer is not what you think)”

The initial implication one might get upon starting to read this article with My name as

the byline is that I had written about a subject I am familiar with. And I stated I had

found the answers to some basic questions. However, as I conclude at the end, the

content of these answers was NOT written by me, but by an AI Chat Bot from

OpenAI.

Many other AI systems exist, with more being made available, evolving, and moving into

new areas of application. The 60 Minutes (CBS) story “The Revolution”

https://youtu.be/TUCnsS72Q9s introduced what is going on at GOOGLE. Their chatbot is named BARD.

So I signed up for access and asked Bard the same questions. The results are

shown below, unedited. I find them to be quite similar to ChatGPT, as they should

when providing factual answers to scientific questions. Equally as accurate, although

some are less ‘chatty’, or perhaps slightly less complete.

(https://bard.google.com/signup )

What caused the failure of the first trans-Atlantic telegraph cable?

BARD’s Response:

The first transatlantic telegraph cable failed for a number of reasons, including:

* Mechanical problems: The cable was made of a copper wire surrounded by gutta-percha insulation, which was then wrapped in hemp and iron wire. The cable was very heavy and difficult to handle, and it was prone to breaking.
* Electrical problems: The cable was not insulated well enough to withstand the high voltages that were used to transmit signals. This caused the insulation to break down, which led to short circuits.
* Environmental factors: The cable was exposed to a variety of environmental factors, including salt water, which corroded the copper wire and the insulation.
* The failure of the first transatlantic telegraph cable was a major setback, but it paved the way for the successful laying of subsequent cables. Today, transatlantic cables are an essential part of the global communications infrastructure.

Is electricity actually an EMF wave or movement of electrons?

Electricity is both an EMF wave and the movement of electrons.

An EMF wave is a disturbance in the electric and magnetic fields that propagates at

the speed of light. When an EMF wave passes through a conductor, it causes the

electrons in the conductor to move. This movement of electrons is what we call an

electric current.

In everyday electrical and electronic devices, the signals travel as electromagnetic

waves typically at 50%–99% of the speed of light in vacuum, while the electrons

themselves move much more slowly; see drift velocity and electron mobility.

For example, when you turn on a light switch, an EMF wave is generated by the

switch. This wave travels through the wires to the light bulb, where it causes the

electrons in the filament of the bulb to move. This movement of electrons heats up the

filament, causing it to glow.

So, electricity is both an EMF wave and the movement of electrons. The two are closely

related, and they both play an important role in the way that electricity works.

Sources info

1. en.wikipedia.org/wiki/Speed\_of\_electricity

Do electrons move through a DC circuit at the speed of light?

No, electrons do not move through a DC circuit at the speed of light. The speed of

light is the speed at which electromagnetic waves travel through a vacuum. In a DC

circuit, the electrons move through a conductor, such as a wire. The speed at which

the electrons move is much slower than the speed of light. The exact speed depends

on the material of the conductor and the strength of the electric field. For example, in a

copper wire, the electrons move at a speed of about 1 million meters per second,

which is about 0.01% of the speed of light.

The reason why the electrons move so slowly is because they are constantly colliding

with the atoms in the conductor. These collisions slow down the electrons and prevent

them from moving at the speed of light.

And Bard can provide alternate answers with other details. Here is the

Draft 2 of the above question, which is actually more like the way I

personally would have expressed it.

Draft 2

No, electrons do not move through an AC circuit at the speed of light. The speed of

light is the speed at which electromagnetic waves travel in a vacuum. When an EMF

wave passes through a conductor, it causes the electrons in the conductor to move.

However, the electrons themselves do not travel at the speed of light. The speed at

which the electrons move is called the drift velocity, and it is much slower than the

speed of light.

In an AC circuit, the EMF wave is constantly changing direction. This means that the

electrons are constantly being pushed back and forth. The average speed of the

electrons is zero, but the individual electrons are moving back and forth at a high

speed.

The drift velocity of electrons in an AC circuit depends on a number of factors,

including the frequency of the AC current, the resistance of the conductor, and the

type of material. In a typical copper wire, the drift velocity of electrons is about 1

millimeter per second. This means that it would take about 10 minutes for an electron

to travel the length of a 10-meter wire.

The reason why the electrons move so slowly is because they are constantly colliding

with the atoms in the conductor. These collisions scatter the electrons, which slows

them down. The higher the frequency of the AC current, the more collisions there are.

This is why the drift velocity of electrons is lower in a high-frequency AC circuit than in

a low-frequency AC circuit.

The type of material also affects the drift velocity of electrons. In a conductor with a

high density of free electrons, the electrons are more likely to collide with each other.

This also slows them down.

The speed of light is a fundamental constant of nature, but the drift velocity of

electrons is not. It can be affected by a number of factors, and it is always much

slower than the speed of light.

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End of content written by BARD

total time to research, write, edit 1 hr 27 min