

VIDEOPOET: A NEW FRONTIER IN ZERO-SHOT VIDEO GENERATION WITH LANGUAGE MODELS

A new wave of video generation models has recently emerged, showcasing stunning picturesque quality. However, one of the main challenges in video generation is producing coherent large motions. Many leading models are either limited to generating small motions or exhibit noticeable artifacts when attempting to generate larger motions.

In order to address this challenge, Google has introduced VideoPoet – a large language model (LLM) that is capable of a wide range of video generation tasks. These include text-to-video, image-to-video, video stylization, video inpainting and outpainting, and video-to-audio. One key observation is that while the leading video generation models are mostly diffusion-based, LLMs have proven to be highly effective in various modalities such as language, code and audio.



Language Models as Video Generators

One major advantage of using LLMs for training is the ability to leverage existing scalable efficiency improvements in LLM training infrastructure. However, since LLMs operate on discrete tokens, video generation can be challenging. To overcome this, we use video and audio tokenizers to encode video and audio clips as sequences of discrete tokens, which can then be converted back into the original representation.

VideoPoet trains an autoregressive language model to learn across video, image, audio and text modalities using multiple tokenizers (MAGVIT V2 for video and image and SoundStream for audio). Once the model generates tokens conditioned on some context, these can be converted back into a viewable representation with the tokenizer decoders.

Examples Generated by VideoPoet

Some examples generated by the model are available on website.

<https://blog.research.google/2023/12/video-poet-large-language-model-for-zero.html>

US CELEBRATES FIRST PRIVATE MOON LANDING IN 50 YEARS



The United States has achieved a major milestone in space exploration with the successful landing of a private spacecraft on the lunar surface. The spacecraft, named *Odysseus*, was built and flown by Texas-based company Intuitive Machines. This marks the first U.S. touchdown on the moon in over 50 years and is also the first ever achieved entirely by the private sector.

The six-legged robot lander touched down at about 6:23 p.m. EST (2323 GMT) near the south pole of the moon, as confirmed by signals beamed back to mission control from some 239,000 miles away. The landing was one day after the spacecraft reached lunar orbit and a week after its launch from Florida.

Despite initial uncertainty due to a faint signal, communication with the vehicle was eventually re-established. However, as planned, the spacecraft was not designed to provide live video of the event.

A Successful Mission

The *Odysseus* spacecraft is carrying a suite of scientific instruments and technology demonstrations for NASA and several commercial customers. These are designed to operate for seven days on solar energy before sunset over the polar landing site.

The NASA payload will focus on collecting data on space weather interactions with the moon's surface, radio astronomy, and other aspects of the lunar environment. This information will be crucial for future landers and NASA's planned return of astronauts later in the decade.

The uncrewed IM-1 mission was launched atop a Falcon 9 rocket by Elon Musk's company SpaceX from NASA's Kennedy Space Center in Cape Canaveral, Florida.

EXPLORING RENEWABLE ENERGY: THE TOP COMPANIES LEADING THE WAY



Renewable energy is a hot topic in today's world, as we strive to find sustainable solutions for our growing energy needs. These sources of energy are derived from natural resources that are constantly replenished, making them an environmentally-friendly alternative to traditional fossil fuels.

Renewable Energy Systems (RES)

Founded in 1982, RES is one of the largest independent renewable energy companies in the world. They specialize in wind, solar, and energy storage projects, with a focus on providing clean and reliable energy solutions. Their innovative approach has helped them become a leader in the industry.

Siemens Gamesa

Siemens Gamesa is a global leader in wind power, providing sustainable energy solutions to over 90 countries. They have a strong commitment to innovation and are constantly developing new technologies to improve the efficiency and reliability of their wind turbines.

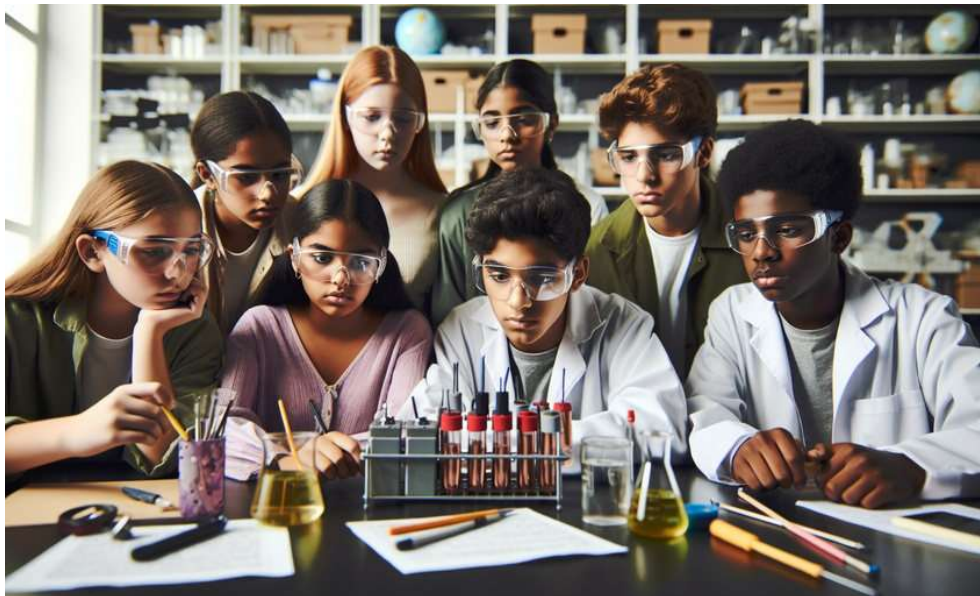
SunPower

SunPower is a leading solar energy company that designs, manufactures, and delivers high-performance solar electric systems. They have a strong focus on sustainability and have been recognized for their efforts in reducing their own carbon footprint.

Tesla Energy

Tesla Energy, a division of Tesla Motors, is revolutionizing the renewable energy industry with their innovative products such as solar panels and the Powerwall home battery. Their goal is to create a sustainable energy future by making renewable energy more accessible and affordable for everyone.

GREEN & SAFE 'WATER BATTERIES' DEVELOPED BY MELBOURNE RESEARCHERS



A team of researchers at RMIT University in Melbourne has made a ground-breaking discovery that could revolutionize the battery industry. They have developed a new type of battery, called an aqueous metal-ion battery, which is not only greener and safer but also recyclable.

The traditional lead-acid batteries that are commonly used in household appliances and solar power storage systems have been known to pose a threat to the environment due to their hazardous chemical electrolyte. But this new water battery, developed by lead researcher Prof Tianyi Ma and his team, replaces the harmful chemicals with pure water.

It's pure water. It's the daily water we drink, but we do add additives to the water like inorganic salts, said Prof Ma.

This breakthrough technology not only eliminates the risk of chemical pollution but also reduces the cost of production. According to Ma, water batteries can be produced for a third of the price of lithium-ion batteries because they do not require complex manufacturing processes and use cheaper materials.

The Science Behind Water Batteries

In their research published in *Advanced Materials*, the team explains how they have coated zinc anodes with a nano material composed of bismuth metal. This coating allows for oxidation to occur, creating a protective layer that prevents dendrites from forming. Dendrites are tiny spurs that can cause problems during charging cycles in traditional batteries. The layer also protects against corrosion caused by the water electrolyte.

REVOLUTIONARY METHOD USES OLD MILK TO EXTRACT GOLD FROM E-WASTE



Discarded electronics, known as e-waste, often contain large amounts of gold and other heavy metals. These valuable metals can be recovered using various methods, but many of these processes rely on synthetic chemicals that can have negative impacts on the environment. However, a team of researchers at ETH Zurich in Switzerland has come up with a new and innovative way to extract gold from e-waste using a surprising ingredient - old milk.

The team, led by Raffaele Mezzenga, used whey protein - a byproduct of the cheesemaking industry - to create a low-density aerogel. This spongelike material is not only cheap to make, but it also has high porosity and surface area, making it an ideal candidate for extracting gold from e-waste solutions.

The process starts by placing whey protein into an acidic solution and heating it. This causes the proteins to unravel and form strands. The solution is then freeze-dried, creating a lightweight puck with high porosity. You can place them on the top of a flower, explains Mohammad Peydayesh, a chemical engineer involved in the research team.

To test the gel's ability to adsorb gold from e-waste solutions containing other metals such as copper, lead, and nickel, the researchers found that it was able to remove 93% of the gold while only removing less than 10% of any other metal. In comparison, activated carbon - another commonly used adsorption method for recovering gold - only adsorbed about 60 mg per gram from an e-waste mixture.

But what happens when this protein sponge is tested with real e-waste? The team dissolved computer motherboards in aqua regia (a mix of nitric acid and hydrochloric acid) and found that each gram of aerogel was able to snatch 190 mg of gold. And when the aerogel is burned, it releases the gold in the form of a tiny hunk of metal - about 91% pure, which corresponds to about 21 to 22 carats.

It was really exciting to find this nugget in the ashes, recalls Peydayesh. Not only does this method present an improvement over traditional methods, but it also has a lower environmental impact. Activated carbon requires a lot of energy to create, making it less sustainable than using old milk.

The team is already looking into other food waste proteins that could potentially be used for other purposes, such as recycling rare earth metals. We can simultaneously address the global waste of food and e-waste to produce something really precious, says Peydayesh.

So next time you pour out that old milk, think twice before throwing it away - it could hold more value than you think!

The value of the gold we recover is 50 times the value we invest to transform the protein into this sponge. - Raffaele Mezzenga