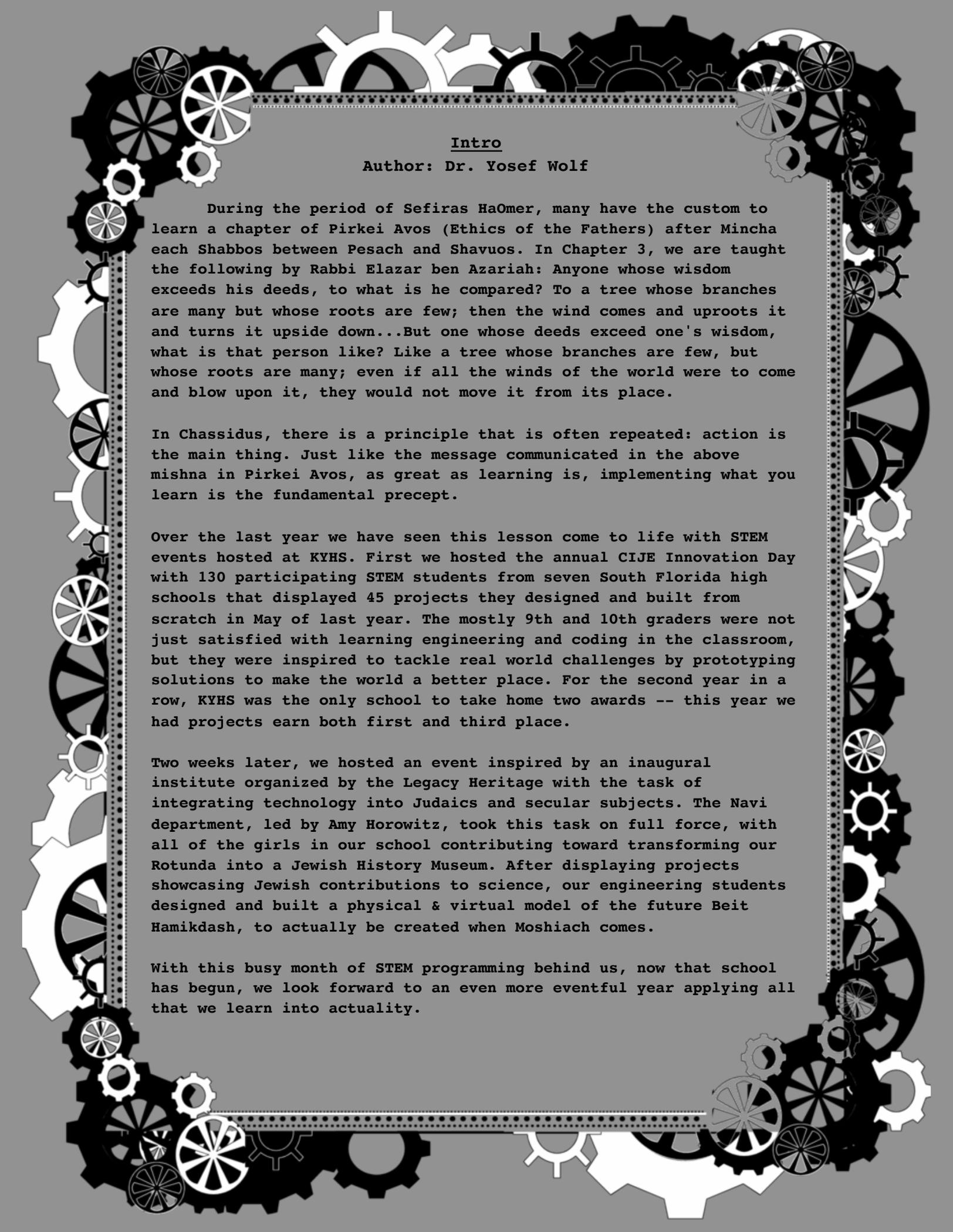




**Katz Yeshiva High School
STEM Publication
2019 Fall Edition**

A decorative border composed of various black and white gears and wheels of different sizes, arranged in a circular pattern around the text.

Intro

Author: Dr. Yosef Wolf

During the period of Sefiras HaOmer, many have the custom to learn a chapter of Pirkei Avos (Ethics of the Fathers) after Mincha each Shabbos between Pesach and Shavuos. In Chapter 3, we are taught the following by Rabbi Elazar ben Azariah: Anyone whose wisdom exceeds his deeds, to what is he compared? To a tree whose branches are many but whose roots are few; then the wind comes and uproots it and turns it upside down...But one whose deeds exceed one's wisdom, what is that person like? Like a tree whose branches are few, but whose roots are many; even if all the winds of the world were to come and blow upon it, they would not move it from its place.

In Chassidus, there is a principle that is often repeated: action is the main thing. Just like the message communicated in the above mishna in Pirkei Avos, as great as learning is, implementing what you learn is the fundamental precept.

Over the last year we have seen this lesson come to life with STEM events hosted at KYHS. First we hosted the annual CIJE Innovation Day with 130 participating STEM students from seven South Florida high schools that displayed 45 projects they designed and built from scratch in May of last year. The mostly 9th and 10th graders were not just satisfied with learning engineering and coding in the classroom, but they were inspired to tackle real world challenges by prototyping solutions to make the world a better place. For the second year in a row, KYHS was the only school to take home two awards -- this year we had projects earn both first and third place.

Two weeks later, we hosted an event inspired by an inaugural institute organized by the Legacy Heritage with the task of integrating technology into Judaics and secular subjects. The Navi department, led by Amy Horowitz, took this task on full force, with all of the girls in our school contributing toward transforming our Rotunda into a Jewish History Museum. After displaying projects showcasing Jewish contributions to science, our engineering students designed and built a physical & virtual model of the future Beit Hamikdash, to actually be created when Moshiach comes.

With this busy month of STEM programming behind us, now that school has begun, we look forward to an even more eventful year applying all that we learn into actuality.

Drones: The Future
Author: Michael Steinhof

You have probably seen a toy drone flying around, but did you know that drones are also being used by companies around the world? Drones have existed for many years, but recently people have discovered various ways to utilize these little, propeller-powered flyers. Drones can be designed to suit any need an organization may have, like aerial surveillance or cargo delivery.

Drones are being used around the world to conduct aerial surveillance. For example, aerial surveillance is used in government and police forces. Recently, the FAA (Federal Aviation Administration) has made it easier for police forces to receive the licenses that allow them to use surveillance drones. These drones will be capable of tracking subjects and collecting photographic evidence from hundreds of feet away. Many individuals are concerned, as this could be considered an invasion of privacy due to the high accuracy of these long-range reconnaissance drones. Surveillance drones are also used widely in the farming industry. These drones are outfitted with special sensors capable of detecting the presence of livestock and water, checking the health of crops, in addition to surveying and mapping land. This ability to monitor acres of land from one location greatly increases the efficiency of farms, eliminating the need to manually inspect the farms.

Another area drones will soon dominate is package delivery. Drones can be designed to carry cargo, making the delivery of packages fast and energy efficient. Amazon has received permission from the FAA to use drones for package delivery. They plan on beginning the testing phase within the next few years. According to Amazon's estimates, this drone delivery could reduce the shipment time for packages to as low as 30 minutes. Amazon plans to begin testing in rural areas and then expand the program to cities if they are successful in their early tests.



Drones have only recently started being used on such a wide scale and are already being used in many industries. Within the next few years, the FAA plans on further expanding their drone policies, allowing greater freedom for companies to integrate drones into normal operations. During the next few years, keep an eye out on how your packages arrive. Maybe one day a drone might just drop it off on your doorstep...

Understanding Cell Phones Once and for All

Author: Ariel Miron

Everyone has come across the same thought after sending a Snapchat or liking someone's post on Instagram: "How the heck is this device able to do the impossible? How can something so small be able to send and receive instantaneous messages, as well as send calls to other devices around the world with the touch of a button?" Spoiler alert: It's not magic. Cell phones are the successful byproduct of a century's worth of scientific discoveries and planning, and right now I am going to explain to you, step-by-step, how they work.



A cell phone is similar to a walkie-talkie. It contains a radio receiver and transmitter (two sophisticated pieces of technology), and uses these as means to receive and send calls. Technically speaking, when you make a call, a microphone in your cell phone converts your voice into a series of electromagnetic signals. Next, a microchip converts the electromagnetic signals into a string of numbers that is passed on to the radio transmitter. The transmitter then sends this string of digits directly to your friend's radio receiver, which converts the message back to a voice recording.

However, the problem with cell phones is that the radio receiver and transmitter can only operate over short distances. Additionally, in a big city with millions of people, these radio signals could get mixed up and end up reaching other people's receivers. Therefore, each cell phone needs to operate under its own frequency, which is basically what resembles a radio's specific electromagnetic signal. That's where those random, massive metal towers you see everyday on the highway come into play. These towers, called masts, receive nearby frequencies and communicate those frequencies to other masts until the call reaches its destination.

Think of the process of making a phone call similar to that of sending a letter. When you send a letter, you place your letter into an envelope with a stamp (which is the equivalent of the microphone converting your voice into signals), then the mailman takes your letter into his van and drives it to the post office (radio transmitter sending the frequency to a mast), then the post office mails your letter to another post office near your letter's destination (a mast sending the frequency to another mast near your friend's phone's location), and then the post office gives the letter to another mailman (the mast passing the frequency to a friend's radio receiver), to which the mailman delivers the letter to your house, and you open the envelope to read the letter (radio receiver to microphone).

That was probably a lot to process, but congratulations. You have just learned how your cell phone works.

What are eSports?

Author: Meir Schochet

If you are involved in pop culture, than over the past few years you have most likely heard the term eSports tossed around. eSports in the simplest terms are the competitive stages on which pro video game players compete with other skilled players from across the world to the excitement of fans worldwide. And as weird as it may sound to watch people play video games, such as Fortnite, League of Legends, Dota 2, CS:GO, or a number of other competitive games, the industry is extremely lucrative.



According to a report from Newzoo, a market analytics company, 380 million people worldwide will watch eSports this year, including 165 million eSports enthusiasts (a term that describes frequent viewers, as opposed to occasional viewers). Most of these viewers were from North America, China, or the largest viewing nation, South Korea. Tournaments and other events can attract viewing crowds that rival most traditional professional sports championships. The 2017 League of Legends World Championship drew more than 80 million viewers, making it one of the most popular eSports competitions ever.

As hard as it may be to imagine for fans of traditional sports leagues like the NFL; eSports, at the highest levels, function similarly. In fact, in April 2018, the NBA held the first inaugural draft for it's eSports league centered around the basketball-themed NBA 2K franchise. During the draft, 102 professional eSports players were selected, with all of the excitement of a draft, usually reserved for traditional sports players.

eSports players, not unlike traditional athletes, can rake in big money. Tournaments can boast millions of dollars in prize money, which is typically split between the players on the winning teams. That means the world's very best players can easily earn seven figures in a year. Teams and event organizers also benefit from tickets sales for these competitions. That popular League of Legends tournament from 2017? It generated \$5.5 million in ticket sales.



This industry is extremely lucrative and finally provides a chance for that percentage of the population who isn't as adept to physical sports, the chance to find a platform in which other people are interested in the very same things they are, and perhaps if they are good enough, to truly find a way to make money, by yes, playing video games.

What is a Water Bear?

Author: Tans Rosen

If I asked you what the strongest, toughest, and most durable animal is, chances are you would say a lion, gorilla, elephant, shark, or other big, ferocious animal. I bet you'd be pretty surprised to find out that the animal that will probably outlive them all is only about 1mm long.

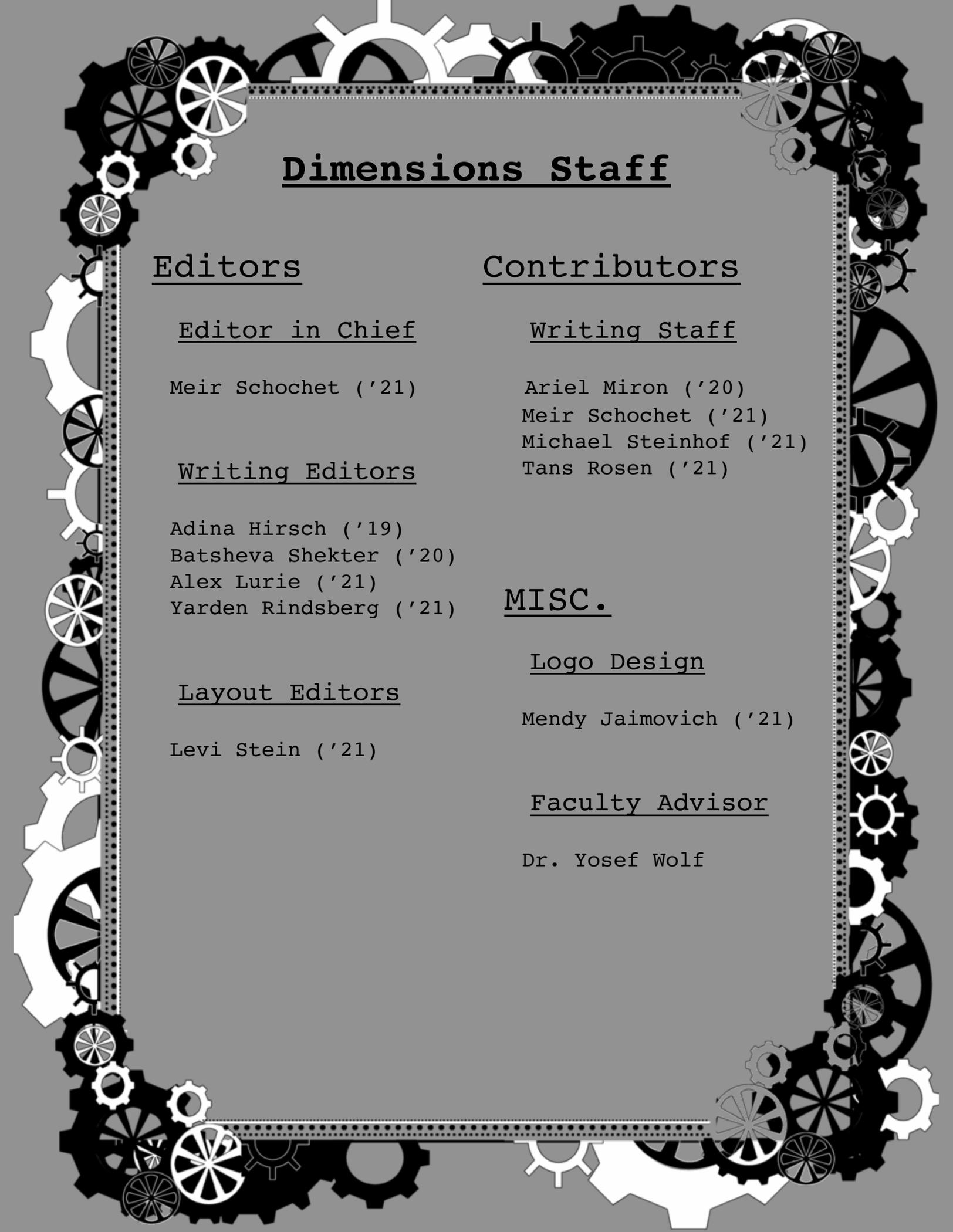


The Tardigrade, or Water Bear, is a 1mm long, near microscopic, animal with a long, plumb body and a scrunched-up head. It has eight legs and hands with four to eight claws on each. Although these tiny creatures appear to be very cute, they are nearly unkillable.

Water Bears have an ability to go into a sort of hibernation for as long as they like. Whenever the environment becomes too uncomfortable for them, they shrink to about 3% their original size and chill out until conditions improve. They can do this for years at a time, meaning they can survive things that would surely kill almost any other living organism.

Water Bears can survive in temperatures as cold as negative 328 degrees Fahrenheit and as hot as 300 degrees Fahrenheit. They can survive being dropped in boiling liquids, being exposed to high levels of radiation, and pressures up to six times the pressure of the deepest part of the ocean. Water Bears have been dehydrated for extended periods of time and have survived. Water Bears have been frozen for years and when they thawed out, they were just fine. They can survive without food or water for years on end. Water Bears have even survived in the vacuum of space for 10 days straight without any protection.

It's been predicted that if the Earth gets destroyed over the next billions of years by pummeling asteroids, supernova blasts, or gamma-ray bursts, Water Bears would be able to survive just fine. In other words, when every other organism on the planet has been killed by some apocalyptic catastrophe, Water Bears will be thriving just as they are now. It is for those reasons that the Water Bear is the strongest, toughest, and most durable animal in the world.



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