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SGA Meeting Rundown: 10/20/20

1. NOTE: With the virus currently on campus, please make sure to use best practices when reading and sharing Paydirt to minimize the spread of COVID. Please keep in mind that articles are written many days before publishing.
2. The SGA had its meeting online only, due to the campus shutdown.
3. Consequences, including removal from office, were stated for SGA members who attended a party and did not report it by Wednesday October 21st.
4. Faculty members are looking for student representatives for several committees. Email SGA President Bradfield if you have questions or are interested: sga.president@npe.nmt.edu
5. There is a new app available to assist in contact tracing. There is GPS tracking, but you may turn that feature off if desired. More information will be available as presented.
6. A program to allow students to anonymously comment on their advisors was raised by faculty, although this is still an idea.
7. KTEK Radio Host auditions and technical training were suspended over the 2 week close-of-campus.
Past and Present: A Look At Campus Life

With all the changes that have been happening to college life in general, a look at the past may help us realize just how far we’ve come. Recently, several New Mexico Tech classes (1958-1962) hosted their class reunion over Zoom and were able to provide some insight as to what campus life was like back in the ‘60s.

Lester Welch (Class of ’62 B.S., Physics) named some of the biggest highlights of his class’ year, which included the opening of a new dorm, currently named West Hall, the arrival of five freshman girls, and passing freshman chemistry. School spirit was about the same as it is now, as was the graduation rate. In Welch’s words, “[approximately one hundred freshmen came in… only [a fifth of those] would graduate.” For James Church (Class of ’60) it was a similar experience; “We knew everyone since there were only a couple hundred students including the grad school.” In recent years, NMT’s campus has experienced an upward trend in its student body, going from only a hundred or so students to slightly over 900 undergraduate students by Fall 2019. Unfortunately for the vast majority of students, however, males continue to reign supreme by a long shot on campus and thus the lack of a college formal also continues.

For many people, the ‘60s were marked by a number of great political and societal events, including the Space Race, the Cold War, and civil rights movement. For Tech students, however, the cutoff between politics and college life was fairly evident. Most, including James Church and Lester Welch, didn’t pay much attention to politics and instead focused on the immediate events affecting their lives. That was the general attitude towards politics then, and it doesn’t appear to have changed much in 2020.

Of the students interviewed, the vast majority were of the same opinion as the classes from the ‘60s, though for a slightly different reason: That politics are so messy and complicated that they feel as if at this point they can’t get involved. However, there were certainly some students, such as one sophomore who politely stated his own opinion on the general political atmosphere on campus.

School spirit with the two sets of students is hugely divided. It must, of course, be taken into account the fact that the current set of students deal with a global pandemic and the past set did not. Not that there weren’t global issues in the ‘60s, of course, but none which were so life-threatening that they all had to stay home or in their dorms and learn at a distance without being allowed to come into contact with.

Letter from the Editor: Regarding Submissions

Hello Paydirt readers. I hope you have all been doing well and staying safe. With the virus going around, classes, events, and meetings have been moved to online formats more and more. We were forced to do the same last semester; we ended up posting the rest of our bi-weekly issues on our website. Luckily, we haven’t reached that point just yet, but one facet of our operation here is almost solely online: submissions.

If you write up an article, draw up some art, or take an awesome photo and send it to us, we can put it into Paydirt. In fact, should the submission be of sufficient length, quality, interest, etc., you can even charge us for your work! Due to the lack of in-person events and what not, we have been struggling to find article ideas as is, so this is the perfect time to send in your pieces.

I have already received several submissions this semester, so I want to make a note on how we evaluate your writing. We desire grammatical proficiency, great word choice, good sentence structure, and interesting ideas, all while maintaining your individual voice. You don’t have to be an award-winning author, however; we can edit out simple mistakes ourselves, and we will make sure to notify you of any major changes.

Our most important requirement for articles is for them to be unbiased and avoid political topics. I have not included the submissions I have gotten due to these reasons. My team and I try our very best to provide interesting content without such biases in our own writing, although the irony of writing a Letter-from-the-Editor while talking about bias is not lost on me.

In the future, Paydirt might switch gears and accept opinion pieces, but for now, we do not. If you are not sure whether we might accept something, send it in anyways! I am sure we can work something out.

Contact me at paydirt@npe.nmt.edu if you have any questions or are interested in working with us. We write Paydirt for students, so I think it only fitting to include student work within our pages. Thank you for your time, and as always, please read responsibly.

- Skyler Matteson
Pumpkins

Pumpkin pie this, pumpkin spice that. It’s hard to escape pumpkin fever once October hits. But, there is one thing we can all agree on, pumpkin carving is an iconic fall activity.

Pumpkin carving did not start out as carving pumpkins, in fact, the Irish began the tradition with carving turnips and potatoes. These carved turnips and potatoes were called Jack O’Lanterns, based off the well known legend of “Stingy Jack.” Now, there’s nothing inherently wrong with being a little frugal with your money, but getting the Devil involved? Not exactly Mr. Stingy Jack’s best idea.

Legend says that one day Stingy Jack invited the Devil out to some drinks at a tavern. They have a grand time, discussing Hell politics and such, until it’s time for Stingy Jack to pay. Since Stingy Jack is, well, stingy he asks the Devil to help get out of paying. The Devil agrees because he didn’t want to pay either (Hell currency and the Euro don’t convert easily). Stingy Jack has the Devil turn into a coin that he could pay for the drinks with. Instead of paying for the drinks, Stingy Jack pockets the Devil in his coin form in his jacket pocket where he also carried a silver cross. The silver cross prevented the Devil from turning back into himself for evading the Devil’s wrath for the second time.

A few years later, Stingy Jack died. After death, he went to the gates of Heaven, hoping to be let in. Saint Peter took one look at Stingy Jack and laughed. He declined letting Stingy Jack due to multiple deals with the Devil and in general being a repugnant person. So, Stingy Jack made his way down to Hell, hoping his old pal the Devil would let him in. The Devil took one look at Stingy Jack and laughed. The Devil explained that according to their deal, he could not let Stingy Jack in and instead turned him away. Stingy Jack pleaded with the Devil, where would his soul go if not Heaven or Hell. The Devil said he would have to roam the Earth for the rest of eternity. Now, I’m not sure if you’ve ever been to Hell, but the way back from Hell to Earth is long and dark. Stingy Jack, sorrowfully, accepted his fate but asked the Devil to at least allow him a light for his journey back to Earth. The Devil gave Stingy Jack an ember straight from Hell and set him on his way. Now, like any good Irishman, Stingy Jack had a random turnip in his pocket. He carved a hole within the turnip and placed the ember inside to light his way. And for the rest of eternity, Jack roams the Earth with a carved turnip and an ember from Hell to light his way.

This tale inspired the Irish and Scottish people to carve faces into turnips and potatoes and leave them outside their homes to help ward off evil spirits such as Stingy Jack. As the Irish and Scottish began to immigrate to America they found that pumpkins were a far better medium for carving. The Jack O’Lantern became a symbol of the season and eventually iconography for Halloween.

Whether you carve pumpkins to ward off evil spirits or to just blow off some semester steam by stabbing things, carved pumpkins are a fun way to get into the fall season and Halloween if you celebrate it. Get creative and find some joy in the simple things this season.

-Alexandra Sartori
The Terrors of Waves

Light is just a funky type of electromagnetic radiation that humans can actually see. Electromagnetic Radiation (EMR) are the waves that carry radiant energy through the electromagnetic field. Humans have come to find that there's a lot of EMR that we don't like, think gamma rays, but recently we've found that there's a form of EMR that we can actually see that we don't like, blue light. The discussion of the dreaded blue light has been on the rise due to the increase in the average person's screen time since the onslaught of stay-at-home orders and quarantines.

The portion of EMR that humans can see is actually fractionally very small, less than 1%. This visible light lies within the ~400 nm to ~700 nm range for wavelengths. Light that we perceive as blue lies within the range of 380 nm to 500 nm. Now if you remember your physics, wavelength and energy are inversely proportional. This means that the blue light range within visible light, although having the shortest wavelengths, have the higher energy. This is why the blue light emitted from electronic devices is commonly referred to as High Energy Visible (HEV) light.

Considering that blue light devices haven’t been around for the longest time, there’s not a substantial amount of research on the long term effects. Yet, there are a multitude of studies on what it can do in the short term.

One of the biggest impacts of staring at your electronic device for hours on end is the feeling of “Computer Vision Syndrome.” This general term isn’t actually a syndrome but more a set of symptoms one is likely to experience. Ever noticed how your eyes feel dry, itchy or just strained after a long day of Zoom classes? That's Computer Vision Syndrome (CVS). CVS hasn't shown to cause persistent issues or damage to the eye, but it's also not exactly something you should be embracing.

Another common side effect of prolonged blue light exposure is headaches and migraines. It’s thought that people who are headache or migraine-prone tend to experience more intense headaches with higher uses of electronic devices. Harvard Medical conducted a study known as acrylic or acrylic glass. To study this, she utilized schlieren imaging techniques to watch as the shockwaves spread through the medium.

Schlieren imaging makes use of the fact that light rays bend as they encounter changes in density of a fluid. For schlieren imaging, a setup consisting of a light source (such as a candle or mercury vapor lamp), a slit for the light source to pass through, mirrors to reflect and create parallel light beams that will pass through the testing material, a razor's edge to focus the beams and then a recording device. Typically schlieren imaging is used with fluids but "it can be used for anything that is optically clear, tracking any variations in pressure, temperature, density that will change the refractive index."

Sivnana, using both her Petroleum and Mechanical Engineering knowledge, wants to correlate the fracturing of the PMMA to rock mechanics. Rock mechanics is the study of the mechanical behavior of rocks, specifically in response to forces within their physical environment. It applies the concepts of engineer mechanics to rock structures created by mining, fracking or other geolomechanic constructions. She's looking to apply the knowledge of PMMA fracturing, to hydraulic fracturing (fracking) to see how fractures connect within bedrock when shockwaves are applied.

Sivana, in the future, is looking to bring variance into her experiments. She wants to observe how layers versus no layers within the PMMA impacts the propagation of the shock waves. She’s also looking to apply stress to different layers within the PMMA to see how the fractures differ with respect to the stress. This is all in an effort to mimic the behavior of underground boreholes to see how she can best direct fractures and get them to “talk,” meaning have the fractures connect and interact with each other.

Graduate school can be a daunting decision for many students finishing up their undergraduate degrees. Sivana Torres took the leap and is now getting to pursue hands-on research she’s passionate about. She thinks "everyone should give grad school a chance, I think it’s an amazing opportunity...you should never feel like you’ve been put in a box by your undergrad work, research is limitless."

-Alexandra Sartori
Student Spotlight
"The learning process continues until the day you die." -Kirk Douglas

Sivana Torres

Going to college for an undergraduate degree is a big and sometimes scary commitment. Pursuing a graduate degree can be an even bigger challenge, even just making the decision on whether to go for graduate work can be terrifying. Sivana Torres, a Mechanical Engineering PhD student pushed through this boundary, taking her out-of-the-box thinking and putting it towards her research.

Sivana, a New Mexican native, completed her undergraduate at NMT in Petroleum Engineering. In her last couple years at NMT as an undergraduate student, she took a Thermodynamics class with Dr. Hargather, saying she “really enjoyed the fluids but didn’t realize how broad the applications could be.” This was a foundational moment in her decision for graduate studies.

She decided on staying at NMT for her graduate work because of how different Tech can be from other graduate schools. “New Mexico Tech was a great option for me, the opportunities here are just so much more hands-on than other research schools instead of just all theoretical study. I even get to be more in control of my research, running my own experiments and procedures.” She’s even found that as a female researcher, she’s treated with the same respect and regard as her male counterparts. “I was nervous at first, entering a field that was almost exclusively male but the NMT graduate program has made me feel welcome and apart of the team.”

Sivana even took a different approach to her graduate discipline than most students, she deviated from her undergraduate concentration. “I think it’s important to know that just because you got your undergrad in something does not mean you’re stuck in that box.” Most Petroleum Engineers, if pursuing graduate work, will typically just further their degree in Petroleum Engineering. Sivana decided to pursue her PhD to be in Mechanical Engineering, and despite both being engineering degrees they can have stark differences in education. Yet, Sivana found a way to harmoniously bring together the two disciplines. “I really liked the rock mechanics aspect of Petroleum Engineering but I also really loved the fluids of Mechanical Engineering. My research has been the perfect marrying of the two for me.”

Sivana is currently putting her research towards understanding how PMMA (Polymethyl Methacrylate) fractures and how shock waves propagate through the solid. PMMA is an industrial produced resin, synthesized using the polymerization of Methyl Methacrylate. It’s better in 2016, where they exposed migraine-prone people to different wavelengths of visible light. They found that blue light had a tendency to increase the individual’s pain, “blue...lights generate the largest signals in both the retina and the cortex.” The stress in the eye from the HEV light is thought to worsen the pain due to overstimulation.

One of the widest discussed issues with blue light is the sleep problems that seem to come along with it. Blue light has been shown to inhibit the production of melatonin within the body. Which at 10 in the morning, might not be a problem but when you’re up late with an online assignment, it can prevent you from being able to fall asleep later. It’s no surprise that our sleep cycle is a delicate thing, and even small amounts of use of electronic devices can impact how and when we fall asleep. The National Sleep Foundation recommends putting away your phone at least 30 minutes before you go to sleep.

Despite all these negative effects of blue light from our devices, it’s hard to escape it in between online school and social media. Some great ways to reduce the effects CVS or headaches are to make sure you’re limiting your device time as much as possible, switching on the “Night Mode” on your phone, blue light glasses and even just breaks from the computer when you feel your eyes starting to strain.

-Alexandra Sartori

-Image 1-

-Image 2-
NMT Project Spotlight: Dr. Andrei Zagrai

With most of the exciting events this year being grounded by COVID-19, there are still some interesting programs available that are still taking off, several of them literally. Dr. Andrei Zagrai, one of our Mechanical Engineering professors here at New Mexico Tech, is working on three separate research projects concerning the increase of safety of space vehicles.

Zagrai, a professor of Mechanical Engineering at NMT who is currently on sabbatical, specializes in the integration of damage assessment systems into the overall structure of vehicles, specifically spacecraft. For him and his team, this is generally accomplished by using sensors installed on vehicle components to communicate with the internal vehicle systems. This in turn informs the system about any cracks in the components, improperly welded pieces, loose bolts, or just any problems with the vehicle structure in general which need to be resolved. This will even go so far as to keep spacecraft from launching should a problem come up.

The overall goal of Zagrai's research is to eventually create an intelligent system that is not only able to gather information to gauge the structural health of vehicles but is also able to discern the flight environment around the vehicle. In many ways, the spacecraft which Zagrai works to improve can be compared to a human being. We can learn things about our environments just from our own senses, such as temperature, pressure, material texture, movement, etc. Zagrai hopes to get his integrated sensors to enable vehicles to do the same thing. "The concept here is the same, that is a system which you have is an intelligent system which can discern the environment, and it also can discern its structural condition.

The first project focuses on Assessment with a focus on structural composites. This project, funded by the National Aeronautics and Space Administration (NASA), seeks to create a “smart” composite which will already contain the sensors mentioned previously. Unlike the other two projects, the smart composite project is led by Dr. Donghyeong Ryu and is a joint project collaboration with the University of New Mexico and New Mexico State University. So while this project may not be entirely unique to NMT, Zagrai believes that the method of the unifying theme of sensor technology development is important for the state. For the professor, the quality which sets Tech apart from other schools for this project is that NMT is the only college to offer students the opportunity to participate in real-life launches, not just simulations like the other schools.

The second project is part of an ongoing collaboration between NMT and the Federal Aviation Administration Center for Commercial Space Transportation to assess space vehicles during flight. This is accomplished by using high-frequency vibration through the electro-mechanical impedance method. In this project, NMT collaborates with Immortal Data, a company working to develop a distributed black box for space vehicles. This approach allows every bit of data to be immediately stored in every single part of the black box. In other words, if one portion of the black box is destroyed, it won't matter, since all of the same data will be available in what remains. At the moment, Zagrai and his team have several prototypes fully built and ready to be subjected to experimentation. One is currently being prepared for a suborbital flight launch.

The third and final project which is nearing completion is devoted to the assessment of structural health in the orbital environment on board of International Space Station (ISS). NMT developed a payload that explores elastic wave propagation in a space ship's structure in space and uses ultrasonic waves to assess the integrity of bolted joints. In addition, the effect of the space environment on piezoelectric sensors is studied. The payload was launched in November 2019 on an NG-12 ISS resupply mission and is currently on an experimental platform outside ISS. The payload is scheduled to return with the SpaceX Dragon capsule sometime this winter.

Needless to say, all of this work is a huge jump forward in space. All this research is being done by Tech students. Each of the teams working on these projects recruits both undergraduate and graduate students. Zagrai wants to be able to give students a chance to really get themselves involved with important research. In general, students join a project through either the Junior/Senior Design classes offered to engineering students or will join through a research assistant program. Joining a project not only affords students the opportunity of getting some hands-on experience but also to do a bit of traveling, as Zagrai enjoys taking his students to various project-related events. Zagrai's main advice is "to be sufficiently open-minded and willing to adapt. It's a cold world, and you have to be willing to be flexible and go where the work is. We value flexibility around here." Zagrai's advice to students is "if you are interested in the team you can contact them." For students who are interested in joining any of Zagrai's three projects, or even just getting a better idea of what research projects are available to join, they can contact any of the following faculty members or groups via email and respective websites.

When asked about his desired qualifications in Tech students looking to join the teams working on these projects, Zagrai surprisingly enumerated that he wasn't so much interested in what majors students were studying, but more what kind of person you are. In Zagrai's words, it doesn't matter so much what your GPA is or if you're a mechanical engineer. It matters most that you are honest, able to trust your team, and care about the research you do. Sure, a high GPA is desirable, but if someone with a low GPA has a deep fascination with the research the team is doing, then they are more likely to actually put quite a bit of time and effort into putting out substantial research. Zagrai himself said that he has a fairly diverse set of students working for him, in terms of majors and in terms of skill sets. When a student is brought onto a team, he pays attention to which interests or personal strengths they have in order to place them into the best position available.

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