AITS Newsletter

Enjoy this brain teaser ☺

"Pale hands I loved, beside the Shalimar" is a line from an old song. What is the Shalimar?

Crisis, Experience and Contribution
[Abraham John, Executive Director, AITS]

When black swan events occur, they come as a complete surprise. The world is never prepared for a black swan event because it is just not within our frame of reference but it always puts us into a mode where we are reacting to the events that are unfolding. There just is not the time or understanding to make thoughtful decisions and choices. We are in such a place in history.

COVID-19 started as a very small spark and became a conflagration in an extremely short period. There was no time for adjustment, planning and preparation. We have had to react to the event and take the steps necessary to keep people safe.

This is one of the rare times when, across the spectrum, experience, contribution and creativity has been on display. Experience has allowed us to react calmly and with alacrity while finding the best possible avenue to help our University and staff to, temporarily, move to a remote learning, remote teaching and remote work situation. One of the gems that comes with longevity at an organization is experience in knowing how best address emergencies. This translates into taking approaches, in a crisis that does not waste energy on exploration. Experience allows actions to be taken that are based on knowledge already acquired.

Through this COVID-19 event, I have seen this play out through the IT ranks at UNT System, UNT, UNT HSC and UNT Dallas. Even as we went through the initial stages of reaction and addressing the immediate need of getting people to a safe work location, it was with a great deal of joy and satisfaction that I saw this experience and knowledge put into practice within all IT groups.

This experience enabled all the various parties in our very large and varied organization to come together and provide technology solutions to all our students, faculty and staff in very quickly.

Everyone has transitioned to remote work, virtual meetings of all kinds, use of UNT laptops/mobile hardware along with personal laptops reaching into office computers and virtual desktops. Provisions were made so that 770 laptops were made available for student (academic) checkout use. Specialized labs made their software available through remote access methodologies.

Our entire university marshalled its resources to achieve remote learning, remote teaching and remote work in a matter of days. IT, my profession, was at the thick of it and it was a pleasure to watch my colleagues in IT utilize their experience to deliver IT services to our constituency.

What we accomplished would not have been possible without the tremendous efforts by our President, all the Vice-Presidents, Vice-Presidential Divisions, budgets, individual staff members going way above and beyond.

To say that I am proud of being associated with the staff at UNT would be an understatement. My profound gratitude and admiration for all the work that has been done by so many to get us to this level of success in this crisis.

My apologies for not being able to provide random trivia but I hope you take a brief break to solve the brain teaser without the help of Google or other search engines ☺

Here are some links regarding the current crisis and for the all of our people working remotely.

https://healthalerts.unt.edu/
https://healthalerts.unt.edu/staff#workplacefaq
https://online.unt.edu/teach
https://online.unt.edu/learn
https://online.unt.edu/work

X-Box "Series X" v. Play Station "PS5" – The Next Generation of Gaming Consoles
[Frank Oliver]

It's here again… the great gaming debate! X-Box or Play Station? I'll not addressing gaming PC's… yes my PC gamers we all know PC gaming platforms are far superior - we bow down and pay reverence to your all mighty powers! Now with that out the way. For us mere mortals who don't have the time, patience or money to invest, we'll continue on. One other factor I will not address is chip sets (a rabbit hole I refuse to go down, lol) – let's be honest most casual gamers don't really care. We just want to enjoy the little time that we have, maybe an hour or so, to relax. For major gamers this is not the article for you. Ok then, the two major consoles (let's leave Nintendo out of this one) are scheduling the release of their gaming systems for this holiday season, let's set the table for the console debate.

There are those that swear their allegiance to one platform over the other. And there are some that will purchase both. Either way the debate has raged on for years, are you X-Box or Play Station (PS)? While that debate has continued, now-a-days the debate has morphed over the past couple of years. One major reason is because of cross platform online game play. Cross platform gaming is basically if you have the game you can play anyone, on-line only, with that game no matter which platform they own. Which was a huge deal for years. Now that's here the debate is center on a couple of other factors:

- Controller design
- Exclusive Titles (aka brand loyalty)
- Price Point

Before we jump into the differences lets point out some similarities: The devices will sport new solid state drives (SSD). That could make these devices 19x faster than their predecessor. Both promise to offer backwards compatibility. Which means that you can use the controllers, games (as far back as PS2 or first Gen X-Box games) and other devices from legacy consoles (i.e. PS4 or X-Box One) insert mind blown emoji! While most expected backwards compatibility, to go as far back as first Gen X-Box or PS2, that's a game changer. They will still use physical disk and download game options. If you're old school (like me), I want the disk! While there have been huge advancements in downloading the games from the game server, I need something I can hold. Both have speculated that they will have 8k resolution, but there is a small difference between the two. PS is said to offer 8k gaming, while X-Box has stated it will support 8k content, which may not include games (this may change by the release of this article…so don't hold me to it). Let's not forget both will have subscription based service. Yes "X-Box Game Pass" and "Play Station Now" will live another day. Also, the "Play Station Plus" and "X-Box Live" multiplayer online platform.

Now on to the debate:

Controllers

PLAY STATION	X-BOX
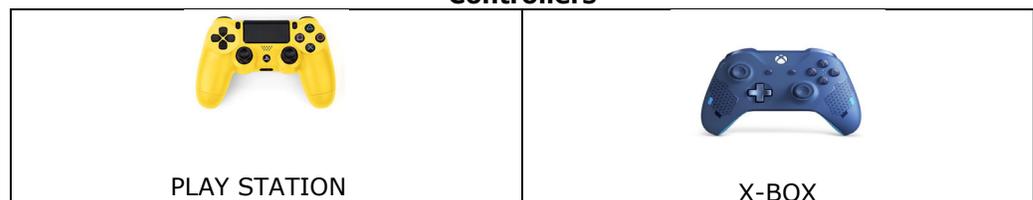
It may be hard for non-gamers to understand, that for some, controller design plays a part in the choice from one console over the other. When I mention design it's not just about how the controller looks but how it feels in your hand and the responsiveness. The X-Box controller is physically bigger and balkier than the PS controllers. Which to some can make it feel uncomfortable in their hands. Also those with smaller hands may lean towards the smaller PS controller. Conversely the smaller PS controller may feel flimsy to someone with larger hands. The controllers have rumble effect. They will shake, raddle and role when necessary, but the feeling is different between the two. Also, the look and conformity of the controllers can feel foreign in your hands. PS kinda have two horns at the bottom, while the X-box is more of an all-encompassing whole hand experience.

Exclusive Game Titles

X-BOX   PLAY STATION

Even novice gamers know that Sony and Microsoft have exclusive games. If you're a big fan of the Halo franchise, Gears of War or Forza then you know the only way to continue the battle will be to purchase the newest X-Box platform. The same can be said for Sony with their exclusive offers like God of War, Uncharted or Horizon Zero Dawn (I could go on and on listing games but let's move forward).

Both manufactures understand brand loyalty is a component of the choice we will make, however, they use a little psychological manipulation. It plays on an individuals need to compete and/or complete task. By offering exclusives that are only available on their platforms your need to complete and/or compete the next task will weigh heavily on the choice you make. Did you know you were in the middle of an ongoing war? It's psychological warfare!

- Side note: PS5 will support Play Station Virtual Reality and possibly a Play Station Virtual Reality 2. X-Box has not mentioned supporting any version of Virtual Reality. For whatever that's worth but it may make a difference to some. I don't think that will be a determining factor for most.

Price Point

They will be expensive! The rumored price point for PS5 is $400 and the Series X is $500. I don't know about you but I had to pause for a second, it seems crazy but that's where the industry is. However that will not deter most.

FYI - in case you've had your head under a rock for let's say the last 10-20 years, gaming is big BUSINESS! I'm talking $43.4 BILLION in 2018 alone. As mentioned earlier these device will be backwards compatible, which would help offset a little of the cost. Sony is not looking to repeat the mistakes of Play Stations past.

The PS3 console was placed at a higher price point than the X-Box 360 which slowed initial sales. As a result the X-Box 360 out sold the PS3 during the initial phase of the competition between the two console giants. Sony did make up ground after making some design changes and most importantly slashing the original price, so all wasn't lost.

But it is a factor that have led some to continue to stay with X-Box (see above article). With a nearly $100 difference between the two consoles, X-Box will come along with a "lite" version or risk making the same mistake PS3 made (just my two cents). However if you have the patience to wait it out, the price will surely drop.

Raging Forward

Ralph Baer

BROWN BOX

Gaming consoles have come a long way since '72 when Ralph Baer released the "Brown Box", which later became known as the Magnavox Odyssey. Not only from how we view them but how we play them. We have many more options. From colors of consoles, to the feel of the controllers. The selection of games is almost endless. It's not just Pong or Ms. Pacman anymore.

Territorial disputes between gaming systems will rage on until the end of time. Whether it's PS, X-Box or some new upstart comes roaring into the mix (yes I know Nintendo is there but that's a rabbit hole). Some will purchase both systems (I know will). But the question they want answered is "which console will you buy first?"

Why… because of the money or course. Remember we're in the middle of a war! A war for our wallets. But honestly there is no wrong choice. At the end of the day it all comes down to personal gaming preference. Choose wisely.

Coder or Climber, why not both?
[Joshua Huckabee]

It might seem as though rock climbing and coding have nothing in common, however this couldn't be further from the truth. In the past year that I have been climbing at my local gym, I have noticed so many similarities in the mental capabilities necessary for my everyday life as a programmer as well as in recreational climbing. These similarities can be summed up in one phrase: problem solving. When I say rock climbing, I mostly mean bouldering. Bouldering is a type of climbing that is not roped and generally the routes don't go higher than 10 -15 feet. Each route in this style of climbing is called a "problem" and requires a unique set of skills (that will vary based on the individual) to solve.

As a developer, the likelihood of working on a project that will fail at some point is inevitable. It could be the smallest syntactic error -- such as forgetting an end of line semicolon -- or something more substantial like not using PHP's PDO class to prevent a first order SQL injection. Regardless of the case, the result is a failure. And failures happen often. While this can be frustrating at first, eventually failure becomes a motivational tool. The exact same process happens with bouldering. Just like coding, it can be the smallest thing, such as a body weight shift one centimeter off center or underdeveloped strength for a specific grip on a route that can lead to failure. With work, patience and tenacity, eventually the code will compile with no errors and the correct output is displayed, or the top hold of the route will be within reach. After working through the languages, environments and lines of code, those failures have finally turned into successes.

Planning is an important part of any IT project. Many of my projects begin the same way: defining goals, creating a wireframe, organizing content, setting a timeline, etc. However, it is vital that we remain flexible in our planning and be able to adapt to any situation that may arise along the way. Sometimes the end user has a change of plans or the scope of a project slowly shifts over a period of time. Whatever the case, we must adapt to perform our best. Climbing is a lot like this, too. It is important to visualize the route before attempting it. Get familiar with all the footholds, maybe try a potentially troublesome section. It's good to have a plan. First attempts often lead to the realization that things don't always go according to plan. Sometimes a sequence needs to be altered on the spot to figure out how to top out, but every second spent on the wall is using up valuable energy so it may be a better course of action to climb down and formulate another plan. Either way, it's necessary. to have a solid visual of the route but also to be willing to adjust along the way.

One should never be hesitant to learn new things. In programming, it's learn or fail. New technologies, languages, frameworks and libraries pop up every single day, and we must be willing to reach out and try to grasp these concepts to continue to be effective and efficient coders. One way that I've found to keep up with the curve is to talk to other individuals, whether it's co-workers, friends who code or acquaintances from local IT meetups. When I'm stuck with an issue and I have no clue why my code is not working properly, I can ask others to read over my work and sometimes the view from a different perspective is all that it takes to solve the problem. In climbing, we call this "exchanging beta." Beta is information about the climb, or how to complete the climb or parts of it. Communicating with other climbers in the gym, whether they are more experienced or not, can

often lead to successfully climbing routes that may have been a struggle to top.

Obviously, there is a physical side to climbing that has no counterpart in our abstract world of 1s and 0s. But I think there is a great counter point here. Solving problems through a physical means can be a fun and healthy way for a coder or anyone in a math- or science-related field to stay in shape after spending long hours at a desk during the day.

Bouldering is much like coding in that there is a constant presentation of problems that do not have a clear solution. Coders must continually learn new ideas while being asked to communicate how and when the problem will be solved. Coders must have an array of tools and a passion for the job, the ability to learn new skills at a moment's notice, the willingness to ask others for help and whole lot of tenacity to keep attacking those problems. Both climbers and coders thrive off of these same situations of running into roadblocks, finding paths around them and continuing on to accomplish their goals.

Wearable Technology: A Game-Changer!
[Kris Leaonard]

In this modern age of the Internet of Things, wearable technology has revolutionized the way athletes prepare and excel at sports. From novice athletes using a Fitbit or other smartwatch to measure the metrics of their run, to professional athletes using the latest in wearable technology to train harder and smarter than ever before, technology is taking the sporting world by storm.

In the past decade, the evolution of wearable technology has completely changed the game across every spectrum imaginable in sports and has given coaches and trainers deeper insight and greater ability to ensure the success of athletes. Through devices such as Catapult Sport's Vector monitoring solution and First Beat's (HRV) Heart Rate Variability monitoring, Coaches here at UNT, and around the globe, can vastly improve individual player performance and injury prevention.

The cornerstone for these advances lies within technologies that have been around and utilized for many years, GPS coordinates and heart rate monitoring. Researchers have been able to make incredible advancements in the data that is gathered from these two seemingly basic measurements. Scientists can now take basic GPS positioning and extract numerous metrics all gathered by measuring an athlete's speed, distance, and direction with pinpoint accuracy. GPS trackers sewn into athletic uniforms are feeding back real-time information on an NFL player's balance, speed, acceleration, and motion. Early signs of injury to soft-tissues are readily detected, letting coaches relieve players before serious problems arise. Impact monitor stickers attached to player's bodies alert coaches and trainers to otherwise invisible signs of a potential concussion, brain trauma, over-exertion, or injured muscles, tendons, and ligaments. These metrics combined with active Heart Rate Variability monitoring increases available data tenfold. Devices already in use are measuring over one hundred human metrics, including heart rate, metabolism, stress load, core temperature, and physical impact from trauma. Researchers are forging ahead, designing devices that will be available in the near future to more accurately measure hydration levels and deeper aspects of physical stress and metabolic function. The bottom line: wearable technology in sports is not only improving athlete performance during games, but also preventing countless injuries and saving lives.

I had the opportunity to spend a few minutes in the weight room with Lucas Lopez, Strength and Conditioning Coach with UNT Athletics. "Wearables have taken the guesswork out of conditioning for us. Before, we had to go on intuition or rely on what we had always done before to guess where an athlete should be performing at any given time. Now, we have the quantifiable data that shows an athlete's progress and we know exactly when we can add more intensity and push them harder. The science is making us stronger," states Lopez. By systematically measuring the endurance and progress of each athlete individually, coaches can ascertain how much additional stress an athlete's body can handle before an injury occurs. The UNT Coaching staff are big advocates of wearable technology and since introducing various wearables throughout Mean Green programs in the past few years, they have seen a vast improvement in strength and performance amongst athletes. And UNT is not alone.

The Florida State Seminoles are another college team that has seen a significant improvement in their statistics due to wearable athletic

technology. In 2013 they strapped on wearable analytic devices made by the Australian industry giant, Catapult. In that year, the team had an 88 percent reduction of injuries to soft tissues. Beyond the collegiate level, professional teams are adopting wearable technology at a staggering pace and the reason is simple, numbers don't lie. In 2012 the Toronto Raptors had the highest rate of injuries in the NBA. Then they started using athletic wearable technology and monitoring players for early signs of soft tissue injury while practicing and playing. In the 2014 season, the Raptors had the least injuries of any team in the league. To take this a step further, coaches at Howard University credit wearable technology with saving lives. "We monitor student-athletes for heat exhaustion. During a typical 100°F practice, the Zephyr™ system alerted me to one student's rising core temperature - before he showed physical signs of illness. We were able to immediately cool and hydrate him for a full recovery," says Daniel K. Bellamy, Director of Sports Performance Howard University Bison Athletics. With results like these, it is no wonder that athletics programs are quick to adopt the use of wearable technology within their programs. Major League Soccer, NFL, NBA, NASCAR, Major League Baseball, and many others across professional and collegiate sports are adopting this technology rapidly. With researchers coming up with new monitoring systems and ways to crunch data continually, the future is bright and limitless for athletes' ability to go faster, further and safer than ever before. Wherever the future of technology may lead, one thing is certain: Wearable technology is a game-changer!

What is Internal Audit
[Mickie Tate]

With our annual risk assessment having recently begun, this is a good time to revisit the role of Internal Audit. What is Internal Audit? By definition per *Wikipedia, The Free Encyclopedia*, Internal Audit is an independent, objective assurance and consulting services agency designed to add value and improve an organization's operations. It helps an organization accomplish its objectives by bringing a systematic, disciplined approach to evaluate and improve the effectiveness of risk management, control, and governance processes. Internal auditing is a catalyst for improving an organization's governance, risk management and management controls by providing insight and recommendations based on analyses and assessments of data and business processes. With commitment to integrity and accountability, internal auditing provides value to governing bodies and senior management as an objective source of independent advice.

How do we see our role within UNT World? Our primary focus is to provide excellent service. We are internal business partners here to help; to be a part of the solution to help make UNT World better for all. We provide advisory, consulting and assurance services to all components of the UNT System. We strive to make improvements through process improvements, discovering control weaknesses and offering recommendations as to how to remediate any findings discovered. We accomplish this through annually developed audit plans, but also leaving time available for management requests. To develop our annual audit plan, we start with a risk assessment, interviewing personnel throughout UNT World. During this interview process we seek to understand goals and processes and determine where risks exist that could impede achieving these goals and maintaining strong and effective processes.

We are committed to the highest degree of fairness, integrity, and ethical conduct in the performance of our mission. Our Chief Audit Executive (CAE) reports to the Audit Committee of the Board of Regents. Internal Audit activities and audit reports are communicated by the CAE to the Board of Regents and all other applicable reporting entities including the State of Texas. This helps to maintain our independence. We adhere to the Code of Ethics as established by the Association of Certified Fraud Examiners (ACFE) and Institute of Internal Auditors (IIA). Furthermore, we will not issue a report without first allowing the recipient the opportunity to review, challenge, question, and respond to our findings and conclusions. Our relationships with the UNT World community will be characterized by respect, helpfulness, sharing, patience, and openness. We are committed to maintaining our professionalism in providing independent and objective findings to make clear and well-informed decisions based on facts and the best information available. We believe that when the University systems are working efficiently and effectively, we all win together.

Information on the UNTS Internal Audit function can be found at: http://www.untsystem.edu/office-internal-audit.

3-D Printing is the Future
[Ryan Ueland]

3D printing is no longer a tinkerers hobby to play with in your garage. Additive manufacturing has grown immensely over the past decade, to a point that is widely used in a varying degree of fields. What was initially a niche hobby market with individuals using low-end plastics and haphazard machines has been moved to an integral part of large manufacturing units and expanded the field of material sciences. With advancements in technology and larger proof of concept successes, additive manufacturing is only predicted to grow into a more pivotal part of manufacturing and, eventually, everyday life.

Printer technology has grown significantly since the advent of the first 3D printers. What were essentially hot metal extruders connected to computer-controlled servos (that were notoriously unreliable and slow) are now a varying array of types and sizes that can be started and left alone for days on end to seamlessly build almost anything. Specialized printers exist now that can print at the micrometer level to construct designs necessary for high precision machine work and manufacturing. At the same time, construction companies are beginning to use printers that are the size of 18-wheelers and train engines to print full-size housing structures in a couple of days. Printer technology has come to a point where if there is a need then there is a good chance that a printer of desired size and precision exists to meet that need.

Additive manufacturing, however, is not only about the machine doing the printing but also the material which are being used for the printing. Originally, 3D printing could only be done with different variants of plastic ranging from rigid, brittle plastics to more soft, pliant plastics. This prevented any growth outside of hobbyists and research, testing scenarios. But over the last decade material sciences have hopped on the 3D printing band wagon and have begun to develop materials and delivery systems that allow for more than just plastic printing. Fast drying concrete is allowing construction companies to print exterior walls in a fraction of the time needed for standard framework pouring. Biotech companies have been developing organic compounds that can be "printed" to create skin grafts and organic bone replacements. Even hobbyists have access to high-end fiberglass and metal materials that can be printed into replacement parts for cars and boats. Some advancements even allow a person to print their own replacement appendage for a lost arm or leg, without worrying about poor quality or the high cost of medical replacements.

Technological advancements will only continue in the additive manufacturing field and will lead to significant monetary growth in relation. Printing is already being used in full production lines for a varying degree of products and has moved well beyond its initial use as a toy in research and development. With the scope continuing to growth there is no end in site to the utilization of 3D printing in construction and manufacturing. Materials growth is also expected to continue upwards for the foreseeable future as more industries try to find new ways to "print" unique materials. Some estimates put the value of the additive manufacturing materials market at over $4 Billion by 2025 with no decline or plateau in sight.

3D printing can easily be viewed as one of the new age growth technologies to come as the "computer age" becomes seemingly normal. The basis of additive manufacturing was seen throughout sci-fi fiction and is now becoming part real life. Imagine being able to print your own tools, food, or

clothes at home and only needing the raw materials to do it. Computers were purely an industrial tool for the first few decades of their existence due to limitations in their manufacturing but are now found in almost every facet of everyday life. So, it is not out of the realm of possibility to think that every household in the next twenty years could have their own personal 3D printer.

Links:
- https://www.benzinga.com/press-releases/20/03/wr15476078/3d-printing-materials-market-worth-4-03-billion-by-2025
- https://www.eurekalert.org/pub_releases/2020-03/uon-bde030320.php
  https://www.industryweek.com/technology-and-iiot/media-gallery/21124280/its-time-to-take-advantage-of-3d-printing

Browser Wars: Chrome, Firefox, and Edge – Which Browser Is Right For You?
[Troy Bacon]

Three of the most popular web browsers in the world are Chrome, Firefox, and Microsoft Edge. While the primary purpose of each browser is to browse the Internet, there are some differences among the three that you may find interesting. This article will briefly describe the features of each browser so you can make an informed decision on what you wish to you.

Chrome is the most popular web browser. According to StatCounter, Chrome has a usage rate of 68.91%. It is full featured and offers integration with your personal Google Account. If you are using Google's other services, such as GMail, then you may find Chrome the most useful browser for your lifestyle. With Chrome, you can add extensions to the browser, which add functionality to the browser for quick access to Gmail, Google Drive, or Hangouts. It is easy to keep your bookmarks synced across devices with Chrome, if you are logged into your Google Account using the browser. Chrome will also block some ads that don't meet their standards. To summarize, Chrome is a free, fast, and light-weight browser.

The second most popular browser is Firefox, with a usage rate of 9.25% according to StatCounter. Recently, Firefox did a major redesign of their product -- calling it Firefox Quantum. With Firefox Quantum, you get a completely redesigned browser from past versions. The new version has the potential to leverage multicore processors in a way that Chrome and Edge are not currently implementing. While this change won't effect your usual day-to-day browsing, it does give FireFox Quantum the benefit of better utilizing future processor improvements. Also, with regard to privacy, Firefox Quantum does offer better privacy protections and anti-tracker support. If privacy is your primary goal, then Firefox Quantum would be a free and fast browser option to consider.

When Microsoft developed Windows 10, they also created a new browser, called Microsoft Edge. This was a new product with its own unique browsing engine. Soon after its initial release, the product failed to gain market share, and most people regarded it as a failure. Since then, Microsoft completely rewrote Edge using the same browsing engine as Chrome. While Edge currently has a limited ability to sync some, but not all, settings across different platforms, the development of Edge has been decoupled from Windows 10 -- meaning there should be more frequent product improvements. While Edge is not as popular as Chrome and Firefox, the new version is stable and usuable. I suspect the browser will see significant improvements over time.

In conclusion, three of the most popular web browsers are Chrome, Firefox, and Edge. Chrome is the most popular browser. If you use Google for email or file storage, then using Chrome would integrate with those other services. Firefox is the second most popular browser. The new version, Firefox Quantum, has the potential to be the fastest browser with newer high-speed, multicore processors. Firefox is the browser to use if you want to have the best control over your privacy settings. Lastly, Microsoft Edge is in its infancy. It is a stable browser that should get better with time.

Agricultural Drones
[Zachary Collins]

The average farm in the United States is about 450 acres, which is a lot of ground to cover. Help is hovering overhead as farmers across the country invest in low-cost drones to monitor their fields. Equipped with cameras, the drones allow farmers to detect trouble spots they may miss at ground level. Bald patches of earth or plants withering under the sun can indicate a pest infestation or an irrigation fail that could cost lots of money.

A number of companies are taking drone patrol even further. They're outfitting the hovering crafts with Artificial Intelligence programs that not only detect problems but analyze them as well. Drones can be programmed to detect a specific type of pest and determine how many are present, even on an individual plant. Or they can be programmed to spot leaks in irrigation pipes that aren't immediately apparent through camera imagery. Some new software programs can also predict crop yield, giving farmers the information, they need to plan for harvest.

American Robotics is one of a few companies going 'next generation' by developing agricultural drones that can spray pesticides in targeted areas, a more sustainable solution than spraying an entire field. Companies hope to create fleets of drones that automatically tend to farmland, returning to home base to recharge then flying off again in formation, keeping a vigilant eye on the valuable real estate below.

Such scenarios might be pricey for many small farms. Agriculture drones in operation today can cost anywhere from $1,000 to $20,000, depending on the quality of the camera and software. But for some robotic companies, it is worth investing in a future that could promote agricultural efficiency and more sustainable practices.

Top Technology Innovations of the 2010's
[Alexandra Martinez]

Since we have entered a new year, and an entirely new decade of technological progress. It's impossible to predict what tech will look like 10 years from now. But as the 2010s came to an end, it's a good time to reflect on a decade of apps, devices, innovations, and tech-driven societal shifts that have radically changed the way we live our day-to-day lives, for better or worse. Here are the Top 10 Technological innovations of the 2010's.

10. The New Entertainment Giants (2019)

While video streaming isn't a new innovation, the end of this decade saw a paradigm shift in how we consume media. Netflix became the entrenched leader atop a new hierarchy of entertainment giants spanning both tech companies and entertainment conglomerates, all launching their own apps and services to gain a foothold in the market. The launch of Apple TV+ and Disney+ back in November of 2019 was only the beginning; Peacock, HBO Max, and others wait in the wings for 2020.

## 9. Xbox Adaptive Controller (2018)
Microsoft took a leap forward for teach accessibility with the Xbox adaptive controller. The adjustable interface is designed for players with disabilities, with two large buttons that can be reprogrammed to act as any standard X. It's also 19 ports and jacks on the back and sides of the device that can connect to a range buttons, joysticks, and switches corresponding to specific Xbox controller buttons.
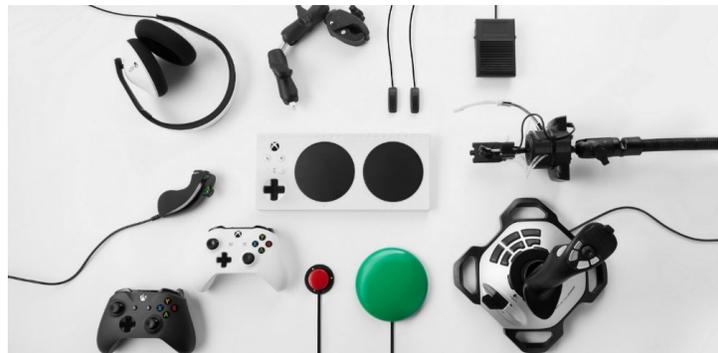
8. Nintendo Switch (2017)

When it comes to gaming on the go, no one can top Nintendo's track record, beginning with the humble Game Boy in 1989. Nintendo has reclaimed its place atop the throne with the release of the Nintendo Switch. The portable and dock able gaming device was announced in late 2016, with availability starting in early 2017.

7. Google Assistant (2016)

Cortana, Alexa, and Siri may have come first, but the Google Assistant has become the most advanced personal AI of the bunch. Google has built the intelligent assistant into everything it does. Beginning with Pixel phones in 2016, then smart home gadgets and chat apps, and now on TVs and even iPhones, Google Assistant is everywhere. In the past, users had to say phrases like "Hey Google" or "OK Google" every time they wanted to trigger the assistant, but a new feature called Continued Conversation, unveiled at the 2018 I/O developer conference; allows for actual back-and-forth conversations. Google Assistant can pick up on cues in the conversation to keep listening for commands. The Google Assistant has become the connective tissue among all of Google's core software and hardware products.

6. Windows 10 (2015)

Windows 10 represented an ambitious but realistic attempt for Microsoft to modernize its OS while also building for the future, introducing concepts like Universal Windows Apps that run on any form factor. The final version of Windows 10 was released to the public on July 29, 2015. Windows 10 was

first released as a preview on October 1, 2014. However it took until January 2019, for it to topple Windows 7 and become the world's most popular OS.

5. USB-C (2014)

It's tough to say there's one universal port for all computing devices. But USB-C is close. Finalized in August 2014, USB-C is an industry standard connector for both data and power using a single cable, and is now found on all manner of devices from simple external hard drives to smartphone charging cables.

4. PLAYSTATION 4 AND XBOX ONE (2013)

In 2013, Microsoft and Sony went head-to-head for the future of console gaming. Sony's PlayStation 4 and Microsoft Xbox One spawned a new era of games and countless think pieces. Although PS4 got the last laugh when it came to units sold. It looks like 2020 is going to be the start of a new console generation with Xbox Project Scarlett and the PS5.

3. Oculus VR (2012)

The virtual reality headset market as we know it began with Oculus. Oculus Rift burst onto the scene with a 2012 Kickstarter which raised almost $2.5 million from 10,000 contributors. Two years later, it was snapped up by

Facebook for $2 billion. Like AR, virtual reality goes back a lot further than the 2010s but this is the decade where it kicked off in a big way. Oculus hasn't become a mass market technology quite in the way that Facebook thought. But the technology is incredibly compelling. Oculus has also been joined by a number of other head-up displays offering virtual reality technology. These range from the HTC Vive headsets to plug-and-play smartphone-based offerings like Google Cardboard. It's fair to say that VR is in a much, much stronger place right now than it was a decade ago.

2. IPads, Chromebooks and the new PC era (2011)

After almost a decade of denying that Apple was working on a tablet computer, Steve Jobs strode on stage in January 2010 and announced the iPad. He boasted it would define "an entirely new category of devices that will connect users with their apps and content in a much more intimate, intuitive and fun way than ever before." During this same year, the first Chromebooks from Acer and Samsung were released. Chromebooks created a new market of cheaper laptops for users who only need the basics and an internet connection. Devices like iPads and Google Chromebooks proved to be good enough for kids, students, parents, seniors, and many others to choose as their main computer. While workers and power users stuck to their traditional keyboard-centric computers, even many of those machines were transformed by the apps and touchscreens of phones and tablets. As the decade ended, our computers took on more and more of the characteristics of our mobile devices each year.

1. The Rise of 4G Networks (2010)

The rise of 4G network ushered in a new wave of mobile innovation. Combined with the rise of smartphones, 4G created the opportunity for apps like Spotify, Twitter, Snapchat, and countless more to exist and thrive. The 4G experience led smartphones to become central to our everyday lives throughout the decade. And it's why there's so much enthusiasm about how the next leap forward with 5G is going to shape the decade ahead.

Introduction to Programming
[Matthew Trammell]

I was in middle school, living abroad in Singapore, when I started programming. My first language was QBasic. I had an Intel based computer, with a turbo button, running MS-DOS. I was exploring MS-DOS as I typically liked to do and discovered a program executable called QBASIC.EXE. I ran it and behold the following screen appeared:
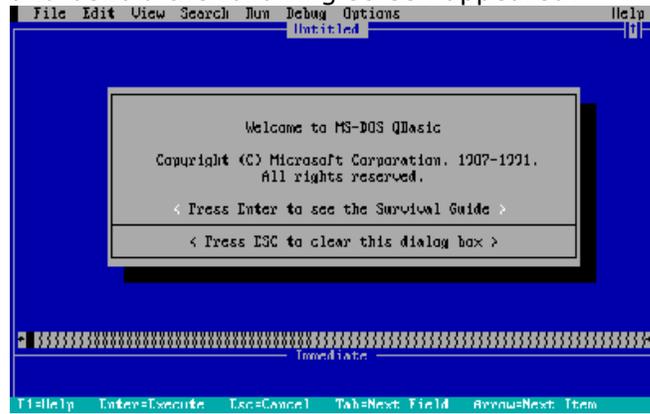
Wow, just looking at that screenshot brings back lots of memories! I pressed Enter to view the Survival Guide and thus began my introduction to programming.

I remember reading through the guide and working through the sample programs. I would also check out several books on QBasic. I remember transcribing lines of code and a few times… maybe more than a few times, I would have my youngest sister type in the pages of code for me. Ultimately, I taught myself to program. In high school, I learned Pascal and C++.

In college, I continued with C++ and added on Java and Assembly. Since then, I have added VBScript, PowerShell, Python, and Go to my programming repertoire. I have been fortunate to be able to use my programming knowledge to assist me in my current position at UNT and programming is something that I still enjoy doing in my free time. I encourage you to learn a programming language especially if you are interested in the computer field and curious about how applications work.

So, if you were thinking about starting programming, what language would you learn first? That is a good question and a tough one. First of all, there are roughly 700 programming languages! Secondly, depending on the programmer you ask, you would most likely get a different answer. Largely, the decision boils down to the kind of programs that you want to write and the kind of devices that you want to write them for. Once you decide that, it makes it easier to choose a programming language. Yet, it never hurts to consult Google with your question. Most of the time… there are probably some things that you do not want to know about! One of the search results that I found was an article called "Top 10 In-Demand programming languages to learn in 2020." Python topped the list with JavaScript, Java, C#, C, and C++ rounding out the Top 6. Several other articles recommend learning a well-established programming language, one that has been around for a while. Timelines are fun, interesting, and a way to help you visualize just that. Below, I have highlighted a few programming languages since 1970:

Pascal (1970)	C (1972)	SQL (1978)	C++ (1983)	QBasic (1985)	Perl (1987)	Python (1990)	Java (1995)	R (1995)	C# (2000)

Once you select a programming language, you will want to download and install the appropriate complier.

A compiler is a program that takes your lines of code, or your input, and turns them into machine code so that the computer can output the results. Microsoft Visual Studio C++ Community 2019 is a great compiler for C++ (https://visualstudio.microsoft.com/vs/features/cplusplus/). While researching information for this article, I learned QBasic is available as a Windows 10 application on the Microsoft Store! You can get it at https://www.microsoft.com/en-us/p/qbasic/9ntmcqwn2sqm?activetab=pivot:overviewtab.

While QBasic is not commonly used today, I think that it still has a place for learning basic programming concepts, batch files, and for nostalgia. Python (https://www.python.org/) and Go (https://golang.org/) are free compilers for you to download as well.

Finally, I cannot conclude an introduction to programming article without leaving you with your first program, or in this case, programs! Typically, the first program that you learn is the Hello World program. This basic program not only shows you the proper syntax, or set of rules, for a programming language, it allows you to test the compiler and make sure that it is installed and configured properly. I included a sample Hello World program in several languages. Maybe you see some similarities?

C++ (First Released 1983):	QBasic (First Released 1985):
```#include <iostream.h>``` ```void main ()``` ```{``` ``` cout << "Hello World!" << endl;``` ```}```	```CLS``` ```PRINT "Hello World"``` ```END```
Python (First Released 1989):	**Java (First Released 1995):**
```print("Hello World")```	```class HelloWorld``` ```{``` ``` public static void main(String[]``` ``` {``` ``` System.out.println("Hello Wor``` ``` }``` ```}```
C# (First Released 2000)	**Go (First Released 2009):**
```using System;``` ```namespace HelloWorld``` ```{``` ``` class Program``` ``` {``` ``` static void Main(string[] args)``` ``` {``` ``` Console.WriteLine("Hello World!");``` ``` }``` ``` }``` ```}```	```package main``` ```import "fmt"``` ```func main ()``` ```{``` ``` fmt.Println("Hello World!")``` ```}```

I hope that you have enjoyed this quick introduction to programming. As you learn programming concepts such as variables, mathematical operations, conditional statements, loops, classes, and more, you will find that adding another language to your repertoire is simply a matter of learning the syntax and applying the programming concepts that you have already learned. Happy programming! Have fun!

Wearable Tech
[James Taylor]

In the past two decades, the average individual has become more connected and more dependent on technology than at any other time. Engaging with technology used to mean sitting down to a desk to use a computer or perhaps a laptop. Now, we carry our smartphones, touch-screen devices capable of technological marvels only Gene Rodenberry could have predicted, with us everywhere we go. It seems only a small leap to say that most of us will soon be wearing technology at almost all times as well.

In fact, that is already happening. Millions of consumers are now wearing smartwatches on their wrists that can integrate with their smartphone or operate on an independent cellular connection. Many of us even wear these devices when we go to bed, in order to monitor our heartrate, breathing, and to detect how well we are sleeping at night. These same devices are then used during the workday to send and receive texts and emails or even make calls. Smartwatches are also changing the way we pay for goods and services as it gets easier and easier to make purchases with Google Pay and Apple Pay.

Despite the headway that smartwatches are making into our daily lives,

there are other examples of wearable tech that didn't fare as well. Many of us remember when Google Glass debuted in early 2013. While there was a lot of general excitement about the product there were also a lot of ethical concerns about privacy regarding such a device. Google Glass featured a built-in camera capable of taking photos and videos with a few taps of the touchpad on the side of the frames. Within two years, Google announced that it would stop production of the Google Glass prototype. It's possible that consumers simply weren't ready for such a product. However in 2017, Google announced the Google Glass Enterprise Edition and Enterprise Edition 2 was announced in 2019. So perhaps we'll see it make a comeback in the business setting.

Wearable tech is extending into other areas of our lives as well. Parents of newborns can equip their babies with WiFi connected sensors that constantly monitor their breathing and heartrate. Similar devices are also available to concerned pet owners that wish to keep an eye on their animal's wellbeing while they're away from home.

The possibilities for wearable tech in the medical field are very promising as well. Sticker-like, wearable sensors are in development that can measure biomarkers such as chloride or levels of glucose in sweat without the need for a battery. Such a device could provide a cheap, effective way for people with diabetes to constantly keep an eye on their blood sugar levels without having to prick themselves.

The trends are clear and before long, we'll start noticing wearable technology more frequently and in more areas of our daily lives. Before much longer, we probably won't take as much notice anymore as it will have become as mundane and normal as seeing someone check their email on their smartphone in public.

Project xCloud
[Christopher Horiates]

When you think of video games you think of being in front of TV and having a console that costs quite a bit of money. Within a year or two your current system will be obsolete and you have to upgrade if you want to stay up with the latest. There are also updates which can take time install if your console has been off. What if I told you that all you need is an Android device, an Xbox Bluetooth controller and access to the internet (either Wi-Fi or data) and you could have access to Xbox games and play them at the same quality you have come to expect. What if I told you that with this setup you no longer have to worry about buying an expensive console and you would still have the ability to play all of the latest games? You might say that's impossible or how?

Well that very technology is now available and will in time become a product offering to anyone who wants to use it. I am referring to Project xCloud from Microsoft. Currently it's limited to beta and invite only. I was lucky enough to get in and in my opinion, this is truly a game changer when it comes to how video games will be played going forward. At the time of this writing the public offering date has not been announced. Apple iOS devices recently were allowed to get the app in a limited beta capacity too.

To briefly sum up what xCloud is and how it works. Take a streaming service like Netflix. You load the app, look for what you want to watch and stream it. Pretty simple and easy. Now apply that to video games. In this case you load the xCloud app, find what game you want to play, start it up and it streams to your phone. You then play the game directly from Microsoft Azure cloud servers and you get the same graphics you would on your current Xbox system. The phone is not rendering the graphics, it's simply displaying the stream and the cloud servers are handling all of the heavy graphic rendering.

You play the game with your Xbox controller and when you are done you just exit the game and close the app, that's all there is to it.

While other companies like Google (Stadia) and Sony (PlayStation) have been doing something similar they have yet to take off. Stadia just lacks the games and the overall experience has not been great from what I have read and talked to a few people who has used it. PlayStation allows you to stream from your console to your phone only if the game is installed on your console. Xbox has a similar feature like this they are testing too. PlayStation does have a streaming game service (like xCloud) but it's only limited to be used on a PlayStation console or PC and not on a phone or tablet as of now.

Recently the head off Microsoft Xbox's division, in an interview, summed up that they only see Google and Amazon as a threat going forward for cloud based gaming. As it stands now Microsoft, Sony and Nintendo are the big three for consoles and only Microsoft has the cloud infrastructure to support cloud gaming. Amazon is set to release some sort of cloud gaming service by end of this year. The thought is that you can reach more people with a lower initial cost offering that does not tie you down to expensive consoles and TV's.

Dylan Wray, Esports Coordinator for UNT had the following to say regarding Project xCloud

"This platform is revolutionary in the sense that it makes high end gaming more accessible to the general population. Traditional sports are popular because anyone can pick up a $20 basketball or football and start passing, and start to learn more about the game. Console and PC gaming have

always had steep startup costs that alienate a lot of people that would benefit from it. This appears to bring an alternative that will allow a lot more people to get exposed to the fun world of video games."

With the future of cloud gaming here or just over the horizon, the future of videos games is about to go through a major paradigm shift. Consoles, which always sold at a loss and has rabid fans who defend them, will become irrelevant if cloud gaming truly takes off. It will then come down do what games you want to play and what company and service provides them. The money is in the games and if you add on subscription based models to that it guarantees revenue for a company and they no longer have to develop and sell hardware. It would come down to running and upgrading cloud server hardware and apps on devices. "Console" exclusives would still be around. The whole argument and flame wars on the YouTube Comments sections for videos from console releases will cease to be a thing. Could this be the last year we see both Sony and Microsoft release a hardware console? Only time will tell how the gaming community takes to all of the cloud gaming options that are about to be released upon the masses.

Safety Tech in Motorcycles Today
[Patrick Kennedy]

Figure 1 - Marc Marquez, a MotoGP racer and personal hero.

Often when I mention my motorcycle hobby, people explain to me at length about how dangerous motorcycles are, and that you would have to be an idiot to ride one. Previously I was completely oblivious to this fact, so I took it upon myself to reflect on the advances in safety technology in motorcycles. As it turns out, life on two wheels is significantly safer than it once was, and a motorcycle accident is not only more preventable, but more survivable than ever.

Safety gear alone has played such a substantial role in motorcycle safety over the years with improvements in helmet impact standards and innovations, airbag vests, better abrasion resistant materials, and more. Helmets now have technologies such as shatter resistant visors, integrated communication systems, impact absorbing technologies such as Bell's MIPS system (Multi-directional Impact Protection System), and lighter materials and more compact packaging. With gear such as Kevlar jeans, summer mesh jackets, abrasion resistant sneakers, and more, riding safe is easier than ever. A lot of the battle with safety on motorcycles is just getting people to wear safety gear. By making safety gear stylish, more comfortable, and easy to wear in public without being immediately obvious, more and more riders are able to find a safety solution that doesn't detract from their motorcycling experience. Moreover, some companies have innovated further by creating vests that inflate upon ejection from a motorbike in order to protect the rider from hard impacts. By wearing protective gear, you can prevent yourself from becoming the next meat crayon to take on I-35.

Figure 2 - Honda Goldwing equipped with an airbag

Motorcycles are also fitted with more tech than ever. Some companies, such as Honda, have even gone so far as to equip some trims of their Goldwing line of bikes with front impact air bags (pictured above). Without the airbag, your body becomes a missile that is just itching to meet a car at 40mph and cause a plethora of head and neck injuries. The airbag helps absorb the impact and prevent a rider from flying head first into the side of a teenager's Chevy Cruze that decided red lights are optional, but text messages are mandatory. Other technologies that make motorcycles not only safer to ride, but more accessible to newcomers as well involve ABS, cornering ABS (normal ABS only really works well in a straight line), wheelie control (although why anyone would leave this on perplexes me), traction control, adjustable throttle settings to limit horsepower and throttle

response, electronically controlled dampeners that hundreds of adjust second to times a traction while maximize better tire leaning, technology, and

more.

Figure 3 - This is what is known as a "Busa Bro." Observe the lack of helmet or any safety gear whatsoever and flip flops, despite riding the notoriously fast Suzuki Hayabusa. Also be sure to note the toddler positioned on the gas tank. Truly a remarkable sighting.

The advent of Vehicle-to-Vehicle technologies that allow vehicles to communicate with one another through short wave communications will further revolutionize safety in motorcycling by alerting drivers of the presence of other vehicles. However, even currently safety technologies in cars are already helping motorcyclists stay safer. Technologies such as blind spot monitoring, automatic emergency braking systems, and lane-keep assists are helping drivers avoid mowing over motorcyclists because they didn't see them. At the end of the day, motorbikes will always be dangerous; the best thing to do is to stay alert, ride defensively, and wear safety gear. A track day is also a great way to learn better bike control, even if you don't plan on finding the limits of what your bike can do!

Figure 4 – Me at a track day

Getting into ESports: A quick start guide
[Dylan Wray]

Last December I was recently at the Arlington Esports Stadium promoting our competitive gaming program known as UNT Esports, to educators and students deciding what collegiate program would be best for them to join. For the first time in my career I had a parent come up and introduce themselves to me and started explaining how awesome their daughter was at Overwatch. The parent was politely boasting about their SR (season rank) and how she would someday make a great addition to a collegiate team. The experience was so surreal for me because this was a single moment that regional esport managers like Greg Adler form UTD, Eugene Friar from Texas Wesleyan, and myself at UNT have been working hard to create in the DFW community.

High school esports across the US is exploding as a new competitive platform to engage students in K-12 schools. The largest active tournament organizer High School Esports League has over 2,500 schools with over 75,000 students participating. Esports at high schools allows educators to reach a new demographic of students and find motivators for them to stay good in school, so they can keep playing video games on campus. It also might allow the students to make themselves eligible for scholarships when they look at colleges.

UNT Esports offered about $800 in scholarships per Overwatch athlete for the 2019-2020 season. So while stakes are relatively low, there is a ton if interest to join programs like UNT Esports. We've experienced over 765 students as of March 1st inquiring about next year's team opportunities for 2020-2021 season, yet there are signs of change as more attention is focused on collegiate esports. There are other colleges that are offering full rides for Overwatch. Harrisburg University and Maryville University offer full ride scholarships for League of Legends and Overwatch and are consistently becoming one of the best teams in both leagues.

So if you are a parent of a child that is considering getting into competitive gaming, there are certainly benefits to do so, but as with all things with our children, knowledge is capital. So if you are a parent, or you a young adult thinking about getting into competitive gaming, I came up with a quick start guide as well as some general advice that I recommend as I start to see more and more students apply to get into a program like ours.

What games should I /son/daughter play?

I'm going to recommend 4 titles that have a healthy professional and growing collegiate scene. All four titles are team based titles that teach teamwork and communication skills.

Moba: The most popular and most supported MOBA (Multiplayer Online Battle Arena) is League of Legends. It has cartoonish fantasy violence and pits 5 players vs 5 players against one another with heroes with abilities to push in and destroy the other team's base. This game is consistently the #1 Esport in the world with Millions of people playing it, and watching it.

Sports Game: The best digital sport game to play is Rocket League. Many titles like 2k or Madden imitate an existing sport, but Rocket League is its own game entirely pitting 3 players vs 3 players controlling rocket propelled cars in an arena playing something resembling soccer and Hockey. The

game has little to no violence involved. (Unless you consider hockey violent) and super fun to watch.

First Person Shooter: I'm adding two games to this category depending on how you feel about violence in video games. Overwatch is a great entry point with cartoonish violence and has grown significantly over the last couple years. Counter Strike Global Offensive is the most constant and long lasting esport title in esports history, but depicts realistic violence. Both utilize mechanics and skills that are on par with, or set the gold standard in FPS esports.

What gear do I need?

Esports requires a certain amount of gear and hardware to get started. If you are unsure if you want to make an initial investment early. There are a lot of LAN Cafés in the DFW area that allow you to pay hourly to access high end PC's and consoles to try some esport titles out. This is where I would get started first, but if you are ready for the next step, this is what I'd look at.

PC gaming: PC gaming is the most popular esport format and has the highest prize pool for professional and collegiate. The main reason PC gaming is often considered "the most competitive" format is the speed you get from keyboard and mice as an interface with the game. Also the hardware that drives the game enables even higher level of game play with higher frame rates and refresh rates giving athletes and extra edge in reaction time over a console that is capped at what hardware can be utilized after release.

You can get a tower set up with as little as $600 as demonstrated by Ohio State Esports program with these specs:

If you're buying a prebuilt computer (as recommended by Esports Ohio): As of July 2019

- AMD Ryzen 5 processor with 2400G quad core processor
- Memory (RAM): 16GB DDR4 2666 MHz
- Hard drive: 512GB solid-state drive
- Graphics: AMD Radeon RX Vega 11
- Operating system: Windows 10 Home x64
- $600

You can certainly upgrade from there, but if you are looking to get into some staple esport games like League of Legends (LoL), Rocket League (RL), or Counter Strike Global Offensive (CSGO). This can get your foot in the door and get started. Here are the System Requirements for those games:

LoL: https://support.lol.garena.com/en_SG/articles/407
RL: https://store.steampowered.com/app/252950/Rocket_League/
CSGO:
https://store.steampowered.com/app/730/CounterStrike_Global_Offensive/

Titles like Modern Warfare, or Overwatch have a bit higher system requirements and certainly worth paying attention to when you are deciding to purchase or build a PC rig.
OW System requirements: https://us.battle.net/support/en/article/65159

Mice and keyboards?

There's a lot of snake oil in the esport industry with high end gear for headsets, mice, and keyboards. I generally look for a mechanical keyboard that is USB (avoid Bluetooth for either keyboard or mice) at UNT we use k65 keyboards from Corsair. For mice, most games work just fine with a few extra buttons. My go to mice at home is a Razer Death Adder for Mobas and FPS games. For mice the most important thing is dropping sensitivity low for FPS, and high for Mobas. They are two very different games, and benefit from different settings respectively.

What about Consoles?
Consoles are a cheaper way to get into gaming, but will cap your skill growth once you get to a high competitive level for FPS titles. Overwatch can be played on console, but console players can't compete with skilled PC players at a high competitive level. If you are just looking to get into it however, you won't notice the difference for a long while. Rocket League however is a great game for console play, most players even on PC will still use an Xbox or a PS4 controller!

Is that it?

As this is a tech article, there are tons of things I could deep dive into but I think this is enough for you to get started. I will say that there are a lot of skills in esports that are often considered "tacit skills" like mindfulness, empathy, and social awareness that turns a great mechanical player into a truly well rounded and exceptional esport athlete. Perhaps we'll touch on that in the next issue!

Solution to last newsletter's brainteaser

The same 5 letters when rearranged will make 2 different words to fill the blanks in the following sentence.

Those who wish to be good -----, must have excellent memories, or their stories run off the -----.

```
LIARS
RAILS
```