

# RACS Newsletter

CEOAS - Oregon State University

## Summer Quarter 2023-2024



## Summer Update



*Figure 1: New Airless Basketball. First every created by Wilson called the Airless GEN1.*

The summer has started, and the weather has changed letting research field work to get started with lots of new students excited to get working. This year we have many undergraduate summer researchers covering a gamut of areas across our college. If you have new students that need access to computing resources and have not already reached out, please do so quickly so we can help get them online. With all the field work the RACS group has been very busy helping 3D print items needed from collection of data to parts for tools and everything in between. Figure 1 shows a new 3D printed Airless Basketball that was created by Wilson. Rather than being inflated, the Airless Gen1 Basketball relies on a 3D-printed polymer lattice structure to replicate the bounce, flight, and feel of a traditional basketball. The

form of the ball features 8 panel-like lobes and a familiar seam structure. Hexagonal holes across the surface allow air to pass through freely. This show the new level of 3D printing happening and the picture for the figure was taken by Wayne Wood who attended one of the largest 3D printing conferences in the world last week.

## 3D Printing Conference

by Wayne Wood

The RAPID + TCT conference was held in Los Angeles California this year from June 25<sup>th</sup>-27<sup>th</sup>. It featured the latest in 3D-printing technology from the industry's leading product and service providers, a full schedule of speakers, and three days of sessions on a wide variety of topics from 3D-printing in space to new techniques in rapid production to



Figure 2: The Prusa 3D Booth.

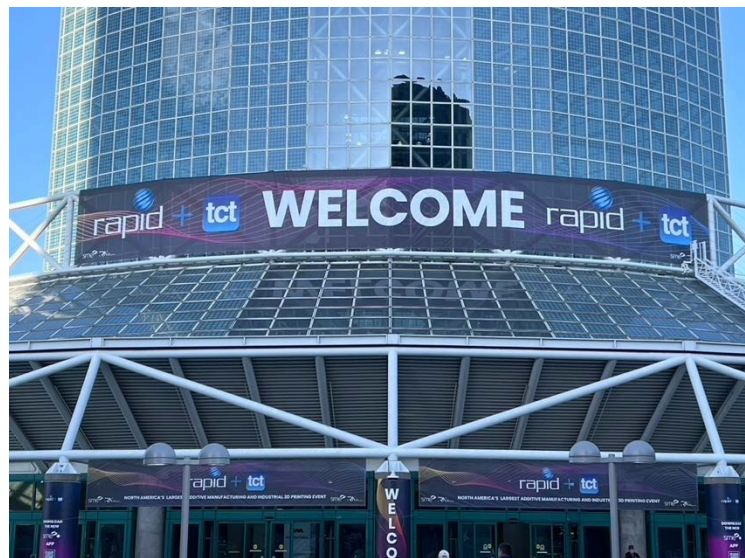


Figure 3: The RAPID + TCT Conference was held at the LA Convention Center.

revolutionizing fashion and textile design. There was also a huge floor show with over 400 companies displaying their latest advancements. It was a fantastic opportunity to learn what's happening in the world of rapid production and make contacts with companies that have technology we could really benefit from.

While I was there, I got to touch base with our favorite 3D-printing company Prusa 3D. We use their printers

every day, so we know how great and dependable they are. They weren't demonstrating any brand-new technology this year, but they were very interested in how we use their printers. So, I'll be following up with them on a potential future case study.

One of the main reasons for attending was to investigate the field of 3D scanning. There were several vendors on the showroom floor that had devices out for demonstration. They ranged from small, hand-held units to large, fully autonomous systems. I was blown away by the level of sophistication, especially on the robot-arm based systems. But for our needs we can certainly get by with some of the smaller units I had the opportunity to try out. Thankfully a lot of the companies I spoke with are more than happy to work with universities so we may have the ability to demo some units before deciding.



Figure 4: Autonomous 3D Scanner Smart Station by 3D Infotech.

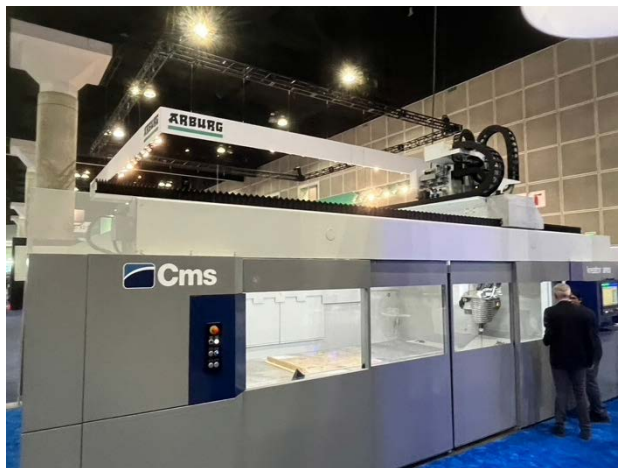
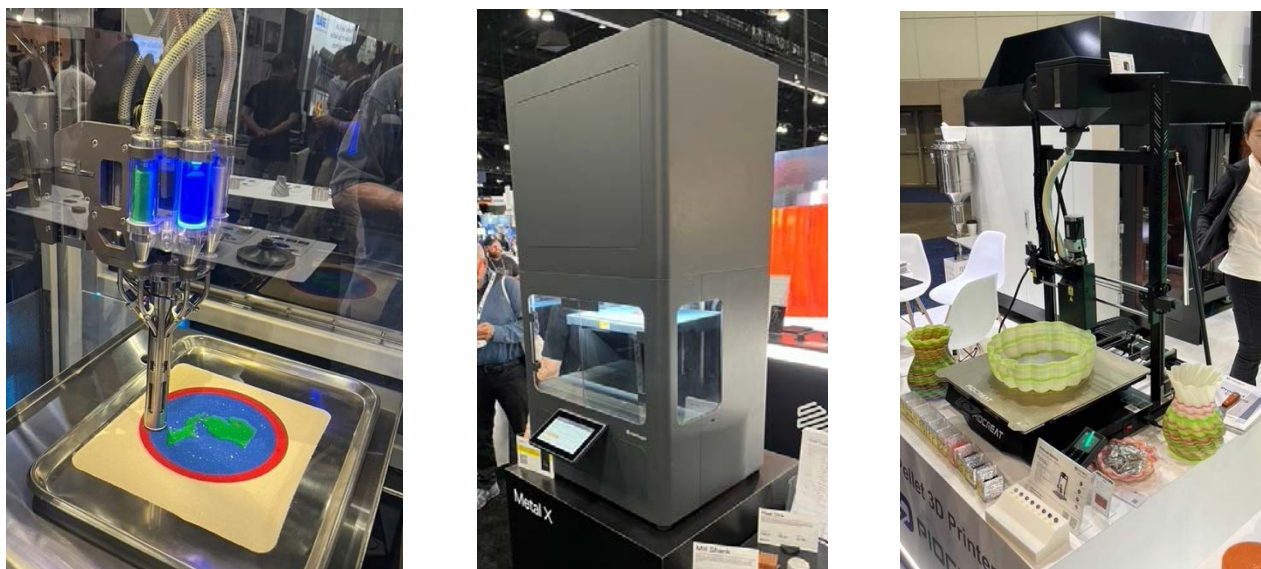


Figure 5: A machine with both 3D and CNC capabilities named "Kreator" by CMS.

While there, I was struck by the size 3D printers can be now. Around every corner on the tradeshow floor there was a bigger printer. One I looked at could print a full-sized chair in 45 minutes. Another from CMS, the Kreator is a hybrid printer and CNC machine that's absolutely enormous (they actually said it was the small version). This beast prints at a 2mm layer height which is roughly 10 times the layer height of our Prusa printers. Simply amazing.

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Something else I found fascinating was the number of different types of printing technologies. A new trend I noticed was some companies moving away from filament-based printing and instead use plastic pellets. From a recycled materials standpoint it's much easier to only need to pelletize what you're recycling/reusing so I was excited to see some changes in that direction. There have also been a lot of changes in printing materials like ceramic, carbon fiber, metal, and new, exotic composites. Price and size requirements have also come down which will hopefully allow us to start moving towards acquiring a more specialized device down the road.



*Figure 6: (left) The 3D powder (metal or ceramic) 3D printer from Grid Logic. (middle) The Metal X printer to print in different types of metals from Markforged. (right) The G5Ultra pellet-based printer from Pico Creat.*

After attending the conference, I felt genuinely empowered by what I learned and the people I met. There is a lot of interest in partnering and working with groups outside what is typically an engineering dominated field. So, I'm really looking forward to continuing to build bridges with the connections I made to help expand what we can do within our college.



*Figure 7: The EDMMax 818W fast wire electrical discharge machining (EDM) system from EDM Network Inc.*

## ECC Update

The ECC Server Room has lost more of its cooling and is being worked on by campus facilities. The system was having issues and as the group working on the system tried to get the now failed unit working again it had a catastrophic failure. This new failure may force the unit into a condition where it will not be able to be fixed again. To reduce heat load in the room we have asked many groups to turn off servers not in use or can be stopped for a short time. The campus is still looking into replacement parts but at the same time we are working to get some more temporary units in the “west” room or Burt 155 so we can bring research servers back online.

OSU Capitol Planning has been working with RACS and the CEOAS and OSU facilities groups to replace the aging units and we are checking the timeline now to understand when we can have new cooling units installed. My current understanding is we have units on order however they are many months out and the campus is looking into ways we can reduce that lead time. Until then we are moving racks and fans around to change the air flow and create the best cooling solution we can.

# Research Computing

by Thomas Olson and Chris Sullivan



## HPC Update

The CQLS continues to migrate users and systems from their old HPC cluster to the new “Wildwood” cluster. They have added more Grace Hopper systems, and you will see the cover of the first ever production Grace Hopper signed by Jen-Hsun Huang Co-Founder of NVIDIA and Scott Ashford the dean of OSU College of Engineering in Figure 8. The CQLS is working with the RACS group along with College of Engineering (CoE), the Digital Research Infrastructure (DRI) and the Network Operations Center (NOC) to test building to building network communications to reduce burden in a single campus server room and support a campus enterprise research file space solution at some point in the future.

We hope to expand the HPC this summer with a major donation from AMD of eight EPYC Genoa 9654 (96 core, 192 thread) processors. A single server configured with two of these processors will support 384 threads on a single machine. This donation was done with the help from the Garwood lab working with others across the college including the Spitz, Lerczak, Ruggiero,



*Figure 8: The cover of the first production Grace Hopper Server signed by Jen-hsun Huang and Scott Ashford. Cover held by Chris Sullivan of RACS and Stan Wysocki of Mark III Systems.*

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Wilson and Thatcher labs. These new processors will be installed into a set of new machines with InfiniBand networking that will support MPI based workloads for large modeling simulations. These new machines will have priority for the groups that have helped purchase the hardware but will also be available for others in the college if needed. Please contact the RACS group if you are looking to leverage this exciting new hardware.

As the summer continues the CQLS will be finishing the migration from their old “Genome” HPC infrastructure to the new “Wildwood” HPC cluster. As this process continues, we should see more and more machines within the Slurm system and more access to file space and other resources. This also means more users will migrating their workloads over and RACS is working with the CQLS to watch over the systems and ensure jobs are processing through properly. If you see any issues, please contact the CQLS or RACS so we can help resolve it quickly.

## Academic Computing

by Cory Langhoff and Wayne Wood

### Computer Lab Moving – Burt 128 moves to Strand 361



*Figure 9: New Strand 361 Computer Lab being rebuilt. The computers and desks are in place and RACS is working with Academic Technology to replace the screens with a 4k projector.*

The 9-panel hyperwall that has been in the GAZE Lab for several years has experienced a failure of one of its monitors. As a result, the RACS group is working with OSU Academic Technologies to replace the hyperwall with a 4K projector and install a set of zoom cameras later in the summer. This provided an opportunity to make some needed changes and upgrades around this space and the Burt 128 computer lab that had limited capacity. The current computer lab in

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Burt 128 is moving to Strand Hall 361 (current GAZE Lab), to provide an increase in class capacity and free up more scientific lab space in the Burt complex. The number of available computer stations is increasing from 23 to 30 seats in this move as well as providing an ADA based computer station. Each computer currently has an i7 CPU, 64GB RAM, and 8GB discrete GPU graphics, along with a single monitor 4K monitor. We are currently assembling the lab and are ordering several more computers to accommodate the increase in seats. Strand Hall 361 is also air conditioned and offers nice views of the MU quad in the center of campus. RACS and Academic Technology (AT) hope to have this classroom available for teaching and open lab hours during Fall term. We hope to continue the development of this space soon for support of Virtual Reality (VR) and Augmented Reality (AR) related classes. If you have ideas around how technology can change the teaching environment, please reach out to the RACS group and share those ideas. We are eager to help change the world of teaching using technology.

## Security Information and Updates

by Thomas Olson and Chris Sullivan

The Office of Information Security (OIS) has informed the RACS group of a SSH security issue for server with external SSH ports open. The vulnerability falls in the Critical range and impacts public-facing SSH on Linux hosts. Details can be reviewed in detail at the following link: <https://www.qualys.com/regresshion-cve-2024-6387/>. The main problem is a major vulnerability was removed in 2006 and was re-introduced back into the code in 2020 that allows a remote person to execute “root” user level code without authentication. The RACS group is working with OIS to verify all the servers within our college that host remote SSH services and ensure they are protected or behind the campus firewall.