Podcast: *ACM Bytecast*
Episode: Amanda Randles

Welcome to *ACM ByteCast*, a podcast where researchers, practitioners, and innovators share about their experiences, lessons, and future visions in the field of computing research. In this episode, host Rashmi Mohan is joined by Amanda Randles, a pioneer in the field of technological sciences and high performance computing. Amanda is the Alfred Winborne and Victoria Stover Mordecai Assistant Professor of Biomedical Sciences at Duke University. She has been a recipient of the National Science Foundation career award and was selected as one of the 10 researchers to work on the Aurora exascale computer. Her visionary work simulating human blood flow in a system called HARVEY was featured in MIT's Innovators Under 35 list.

To begin, Amanda offers listeners an explanation of herself and her current field of work. Her biomedical engineering research group at Duke University is focused on building large scale personalized blood flow simulations. Her passion lies in using the largest supercomputers in the world to answer questions otherwise left unanswered, a space she has been working in for the last 10-15 years. Her journey to being involved in computing began in her math and sciences high school program. Her major in college was in physics and computer science, and Amanda believes everything she has done throughout her career has fallen in this intersection.

Then, Amanda speaks of her 3-year involvement with IBM's Blue Gene Team, a unique time period in parallel computing in the U.S. Here, she learned a lot about how to debug programs and identify and work through problems with the entire staff. She was able to keep these things in mind while building Harvey. In a lab she attended during her time at Harvard, Amanda learned about fluid dynamics and began writing Harvey from scratch based on the work her team had been doing. Listen as she explains the technical functions of Harvey, whose computing powers vary greatly depending on the issue you're trying to address. In the future, she hopes to shift Harvey to cloud-based systems so it can be accessible for all clinicians and hospitals.

Next, Amanda discusses the wide opportunities available right now in the area of personalized simulation. While there are many challenges the industry is currently facing, they could use all the assistance they can get. With the explosion of machine learning and AI, we're at the beginning of seeing the connection with machine learning and physics based models. Addressing how to mitigate risks, Amanda reveals that has been a major issue plaguing this area. It's critical to understand flow models and connect the machine learning device to the process. Finding ways to validate the model to ensure accuracy in models is important to take into account, too.

During the pandemic, Amanda used her area of expertise to address the widespread significant ventilator shortages. The team at Duke developed a 3-d printed device which could be used with two patients at the same time rather than just one. As the episode draws to a close, Amanda elaborates on the industry developments she is most looking forward to seeing in the near future.

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Timestamps:
0:30 - Host Rashmi Mohan introduces today's guest Amanda Randles

1:46 - Amanda introduces herself and her work.
6:45 - Discussing Amanda's involvement with the Blue Gene Team.
10:15 - The idea behind Harvey.
13:52 - Explaining how Harvey works.
20:10 - Opportunities in the area of personalized simulation.
27:25 - Mitigating risk.
32:50 - Is this model becoming more affordable?
38:48 - Amanda's work during the pandemic with ventilators.
45:40 - What Amanda is most anticipating for the future of the industry.

Links:
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