

فناوری‌های نوین مالتی‌مدیا برای محیط‌های هوشمند

New Generation Multimedia Technologies for Smart Environments

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دانشگاه تهران

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Top 10 Technology Trends for 2019: IEEE Computer Society Predicts the Future of Tech



**IEEE
COMPUTER
SOCIETY**

<https://www.computer.org/press-room/2018-news/ieee-cs-top-technology-trends-2019>

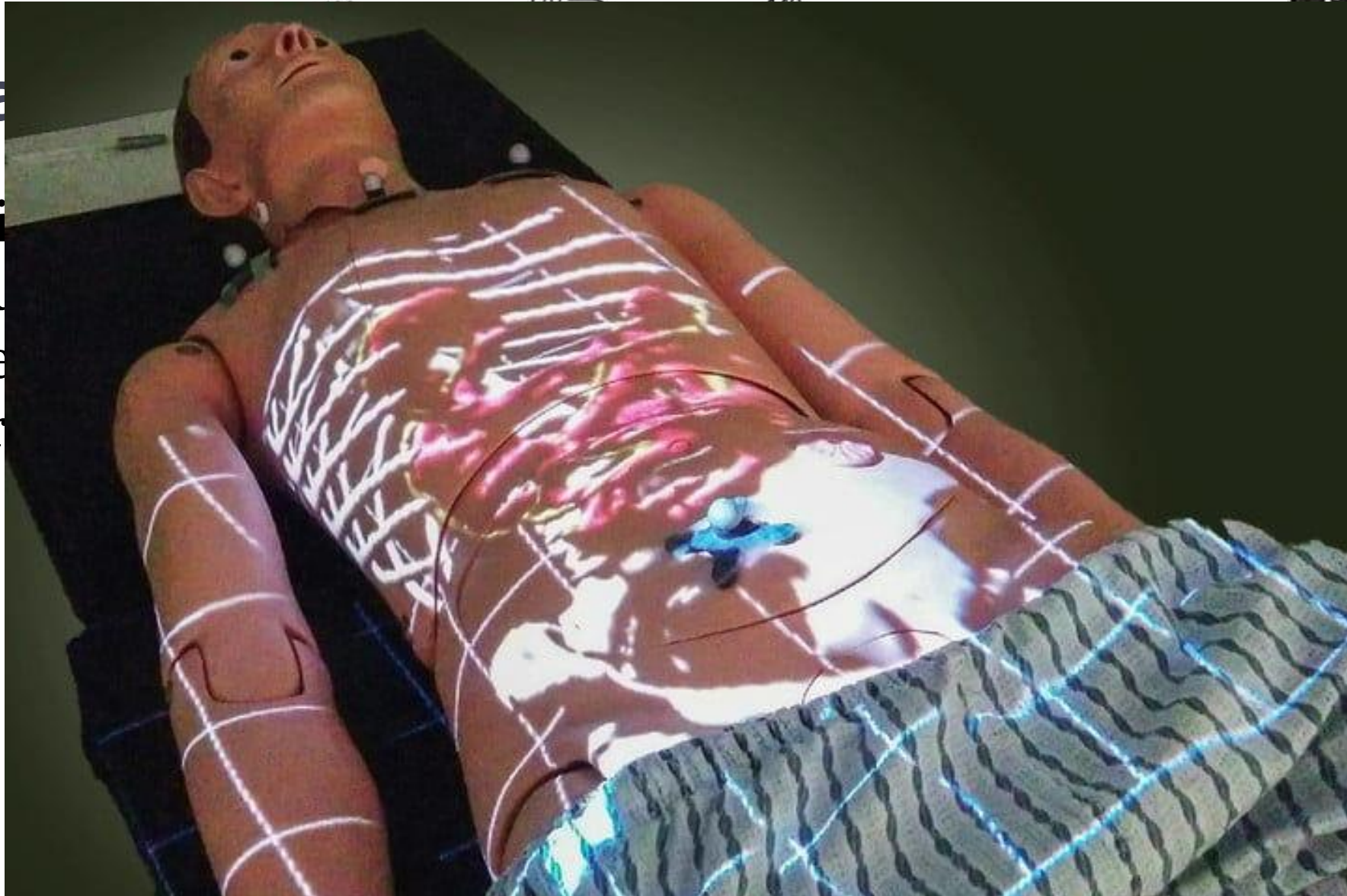


Deep learning accelerators

- The development of these technologies will allow machine learning (or smart devices) to be used in many IoT devices and appliances

Virtual

- Gamification
consumers
AR technology
other



Assisted transportation

- While the vision of fully autonomous, self-driving vehicles might still be a few years away, increasingly automated assistance is taking place in both personal and municipal (dedicated) vehicles. Assisted transportation is already very useful in terms of wide recognition and is paving the way for [fully autonomous vehicles](#).
- This technology is highly dependent on deep learning accelerators (see #1) for video recognition.

The Internet of Bodies (IoB)

- IoT and self-monitoring technologies are moving closer to and even inside the human body.
 - Consumers are comfortable with self-tracking using external devices (such as fitness trackers and smart glasses) and with playing games using augmented reality devices.
- Digital pills are entering mainstream medicine, and body-attached, implantable, and embedded IoB devices are also beginning to interact with sensors in the environment.
- These devices yield richer data that enable more interesting and useful applications, but also raise concerns about security, privacy, physical harm, and abuse.

Social credit algorithms

- Recent algorithms use facial recognition and other advanced biometrics to identify a person and retrieve data about that person from social media and other digital profiles for the purpose of approval or denial of access to consumer products or social services.

Edge computing

- This is the conversion of IoT data to usable information using microprocessors collocated with the sensor, or at the edge of the network.
- Edge computing reduces network bandwidth, data storage, and analysis requirements.
- The price is increased power at the mobile device, requiring innovations in energy harvesting and storage. Innovations in edge computing will accelerate new developments across a wide array of applications.

Gartner Identifies the Top 10 Strategic Technology Trends for 2019

Gartner[®]

<https://www.gartner.com/en/newsroom/press-releases/2018-10-15-gartner-identifies-the-top-10-strategic-technology-trends-for-2019>



Autonomous Things

- Autonomous things, such as robots, drones and autonomous vehicles, use AI to automate functions previously performed by humans.
- Their automation goes beyond the automation provided by rigid programming models and they exploit AI to deliver advanced behaviors that interact more naturally with their surroundings and with people.

Digital Twins

- A digital twin refers to the digital representation of a real-world entity or system. By 2020, Gartner estimates there will be more than 20 billion connected sensors and endpoints and digital twins will exist for potentially billions of things.
- Organizations will implement digital twins simply at first. They will evolve them over time, improving their ability to collect and visualize the right data, apply the right analytics and rules, and respond effectively to business objectives.



Digital Art Museums

<https://www.trendhunter.com/trends/digital-art-museum>

- The summer in Tokyo will see the opening of the Mori Building Digital Art Museum: teamLab Borderless as part of a collaboration between Mori Building and the art collective teamLab.

Empowered Edge

- The edge refers to endpoint devices used by people or embedded in the world around us. [Edge computing](#) describes a computing topology in which information processing, and content collection and delivery, are placed closer to these endpoints. It tries to keep the traffic and processing local, with the goal being to reduce traffic and latency.
- In the near term, edge is being driven by IoT and the need keep the processing close to the end rather than on a centralized cloud server. However, rather than create a new architecture, cloud computing and edge computing will evolve as complementary models with cloud services being managed as a centralized service executing, not only on centralized servers, but in distributed servers on-premises and on the edge devices themselves.
- Over the next five years, specialized AI chips, along with greater processing power, storage and other advanced capabilities, will be added to a wider array of edge devices. The extreme heterogeneity of this embedded IoT world and the long life cycles of assets such as industrial systems will create significant management challenges. Longer term, [as 5G matures](#), the expanding edge computing environment will have more robust communication back to centralized services. 5G provides lower latency, higher bandwidth, and (very importantly for edge) a dramatic increase in the number of nodes (edge endpoints) per square km.

Smart Spaces

- A smart space is a physical or digital environment in which humans and technology-enabled systems interact in increasingly open, connected, coordinated and intelligent ecosystems. Multiple elements — including people, processes, services and things — come together in a smart space to create a more immersive, interactive and automated experience for a target set of people and industry scenarios.


Some other challenges we have to address

- The need for maximal compression efficiency for video is pressing and urgent, since about 75% of the data transmitted on world-wide networks is video, and that percentage has been steadily growing and is projected to continue to grow further.
- The introduction of ultra high definition (UHD), high dynamic range (HDR), wide color gamut (WCG), and high frame rate (HFR) video services have increased the challenge with their use of larger frame sizes, faster refresh rates for progressive-scan video, and greater pixel bit depth.

Knowledge Areas for Smart Environment

- AI and Machine Learning
- Multimedia
- Hardware Engineering/Computer Architecture
- IoT

برنامه کارگاه

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Hoda Roodaki received her B.Sc., and M.Sc. degrees in Computer Engineering from University of Tehran and Sharif University of technology, respectively. She pursued her Ph.D. degree at the University of Tehran, Iran. She was a research assistant at Nokia Research Center, Tampere, Finland in 2012 and 2013 and also a research assistant at ITRC, Tehran, Iran in 2014 and 2015. She is currently an assistant professor at K. N. Toosi University of technology, Computer Engineering Department. Her research interest is video compression including 360-degree and immersive video, multiview and scalable video and also cloud gaming.

برنامه کارگاه




ارزیابی کیفیت ویدئو

دکتر محمد قنبری


۲۰
دقیقه

Mohammad Ghanbari is a professor of video networking at the University of Tehran, Iran and Emeritus Professor at the University of Essex, United Kingdom. He is best known for his pioneering work on two-layer video coding for ATM networks (which earned him an IEEE Fellowship in 2001), now known as SNR scalability in the standard video codecs. He has registered for thirteen international patents on various aspects of video networking and was the co-recipient of A.H. Reeves prize for the best paper published in the 1995 Proceedings of IET on the theme of digital coding. He is the author of seven books and his book: *An Introduction to Standard Codecs*, received the year 2000 best book award by IET. Prof. Ghanbari has authored or co-authored more than 700 journal and conference papers, many of which have had a fundamental influence in the field of video networking. He was one of the founding Associate Editors to IEEE Transactions on Multimedia (IEEE-T-MM) and had served from 1998-2002. On January 2014 he was honored to Life Fellow of IEEE.

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Farhad Pakdaman received his B.Sc. in computer engineering from University of Mazandaran, and his M.Sc. and Ph.D. both in Computer Engineering from the University of Tehran in 2013 and 2019. His Ph.D. research included several power-aware and power efficient solutions for HEVC video coding. His research interests include multimedia systems and applications, video processing and compression, power-aware computing, application specific architectures, and recently machine learning for multimedia systems. From 2014 to 2017 he has served as a lecturer at the University of Mazandaran. From January 2018, he has also been a researcher at the Multimedia Research Group (MRG), Tampere University, Finland. He is currently a researcher at the Multimedia Processing Lab, University of Tehran, and also in MRG research group, Tampere University, Finland.

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رویکردهای نوین در صنعت رسانه: شخصی سازی
و تجربه غوطه‌ور شدن در رسانه

دکتر کوهیار مینو

۲۰
دقیقه

Koohyar Mino has BSc from Sharif University of Technology in 1990, his MSc from Stanford university in 1994 and his PhD from UC San Diego in 2008.

With more than 25 years of experience, Koohyar is an industry veteran in the field of video processing and compression. He is a technology consultant, advising broadcasters and multi-media companies to shape and achieve their strategic goals to embrace the emerging media technologies.

Koohyar has contributed to many pioneering projects that have greatly influenced the production, communication and consumption of multi-media content (while holding technical positions at Arris, Motorola, Google, Apple, and several startup companies in the Silicon Valley).

Since 2010, Koohyar has been an active member of MPEG in developing many of MPEG projects related to popular technologies such as HEVC, SHVC, HDR10, etc.

Koohyar's current involvement with the industry is in the areas of compression and transportation of immersive media such as 8K and HDR as well as production and streaming of VR and AR contents. His latest gig involves exploring the new possibilities in education and e-learning by employing AR and VR technologies.