Dolby Laboratories: Advanced Technology Group Info Session

Agenda

Intro to Dolby

Dolby Sound Technologies

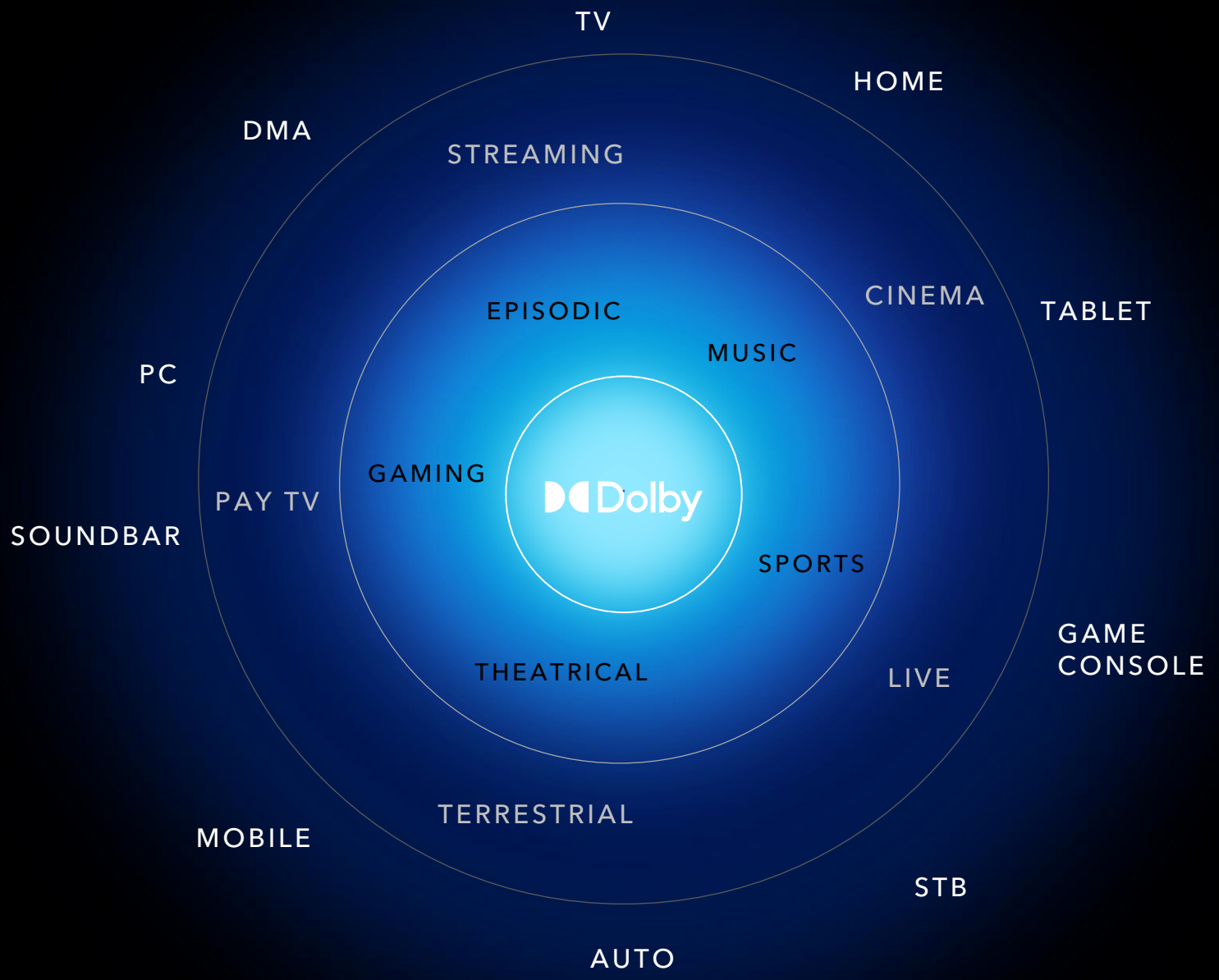
Dolby Image Technologies

Dolby Network Coding Technologies

30+ CITIES
20+ COUNTRIES
2300+ PEOPLE

DOLBY OFFICES
RESEARCH & ENGINEERING

Enabling the Entertainment Ecosystem




LIVE. DIE. REPEAT
TOM CRUISE
EMILY BLUNT
EDGE OF TOMORROW


BLU-RAY 3D™ + BLU-RAY™ + DIGITAL DOWNLOAD
VALERIAN
AND THE CITY OF A THOUSAND PLANETS

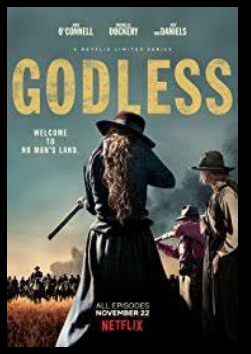

okja
NETFLIX | JUNE 28


WONDER


HARRISON FORD
BLADE RUNNER
THE FINAL CUT

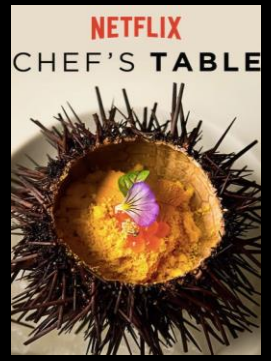

GLOW
ALL EPISODES JUNE 23
NETFLIX


THE LEGO MOVIE


GODLESS
WELCOME TO NO MAN'S LAND.
ALL EPISODES NOVEMBER 22
NETFLIX


NETFLIX
STRANGER THINGS


STAR WARS


NETFLIX
CHEF'S TABLE


BLADE RUNNER 2049


DUNKIRK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EVEREST


MINDHUNTER
13 OCT | NETFLIX


Disney

NETFLIX


Paramount
A VIACOM COMPANY


UNIVERSAL


SONY
PICTURES

LIONSGATE


Metro Goldwyn Mayer
TRADE
MARK

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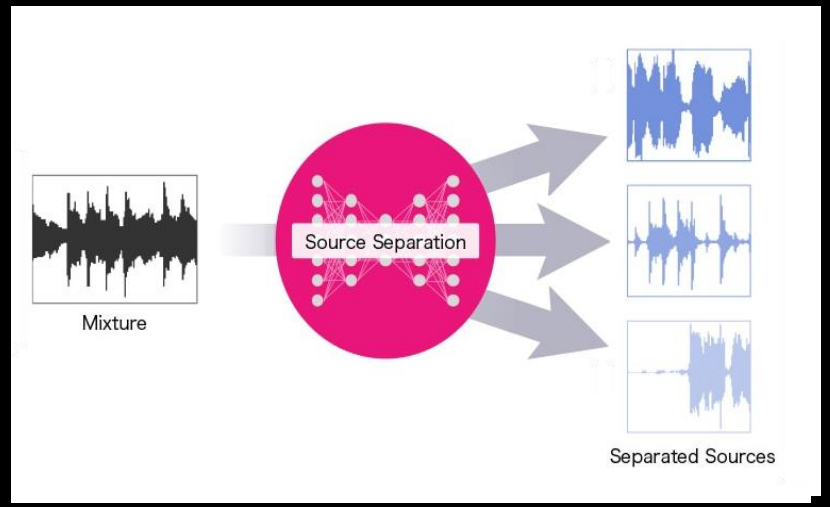
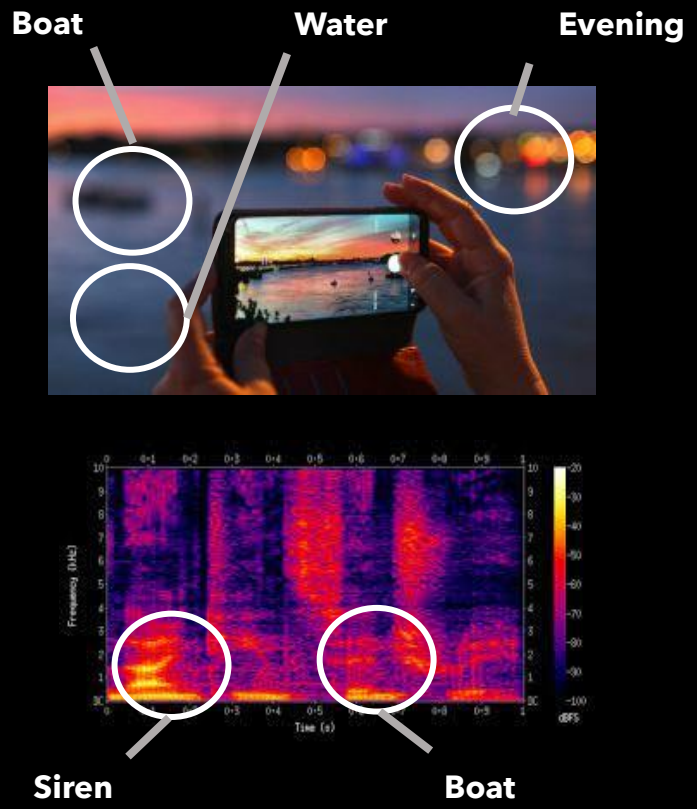
Sound Areas of Interest

- Deep Learning for audio applications
  - Source separation
  - Classification
  - Generative audio
- Multi-modal analytics (audio/video/etc.)
- Audio capture
- Audio coding
- Audio processing
- Data analytics
- Audio rendering (headphones, speakers)
- Game engines
- Virtual Reality
- Augmented Reality
- Immersive experiences
- Human perception
- Objective quality metrics

DEEP LEARNING FOR AUDIO APPLICATIONS

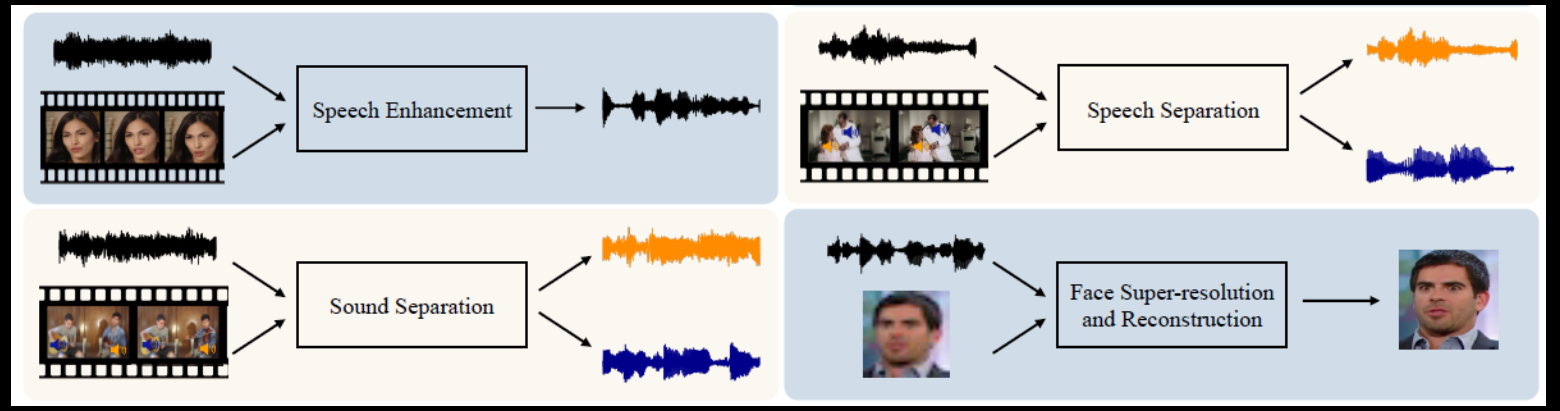
- Source Separation
- Classification
- Generative Audio

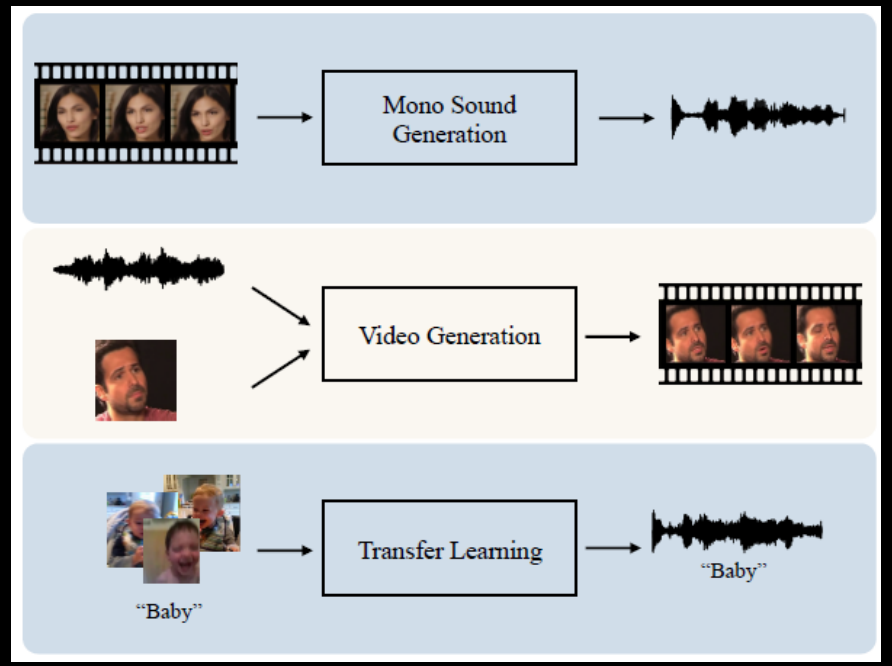


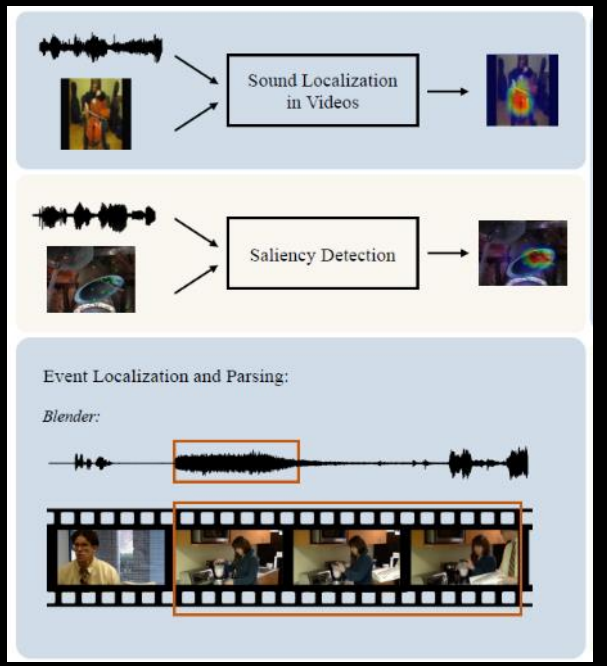


MULTIMODAL ANALYTICS

- Multi-Modality
  - Text/Audio/Video
  - Explore correlation
- Analysis
- Representation
- Generation
- Processing

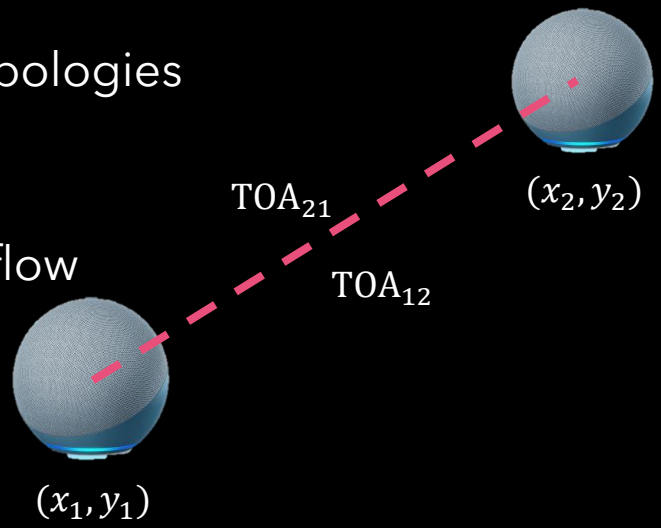




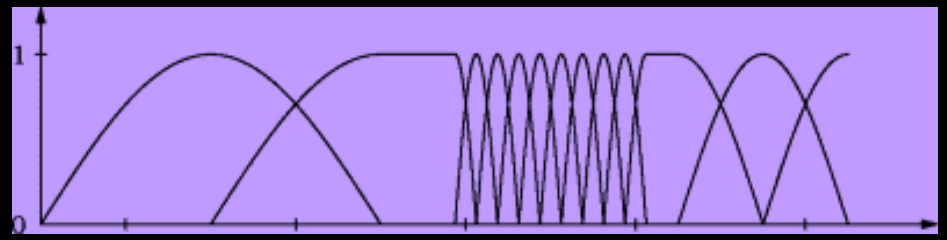


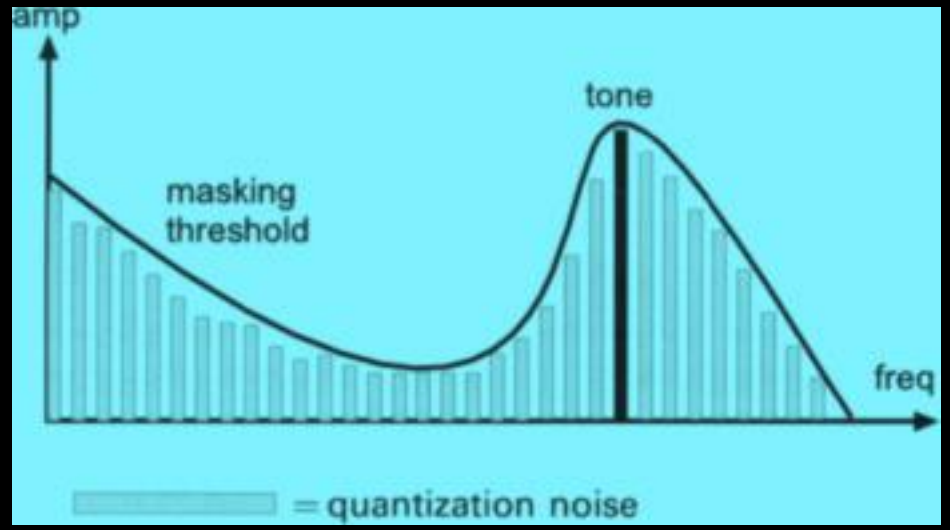
- Orchestrated capture
  - Distributed processing
  - Geometric inference
  - Room acoustics

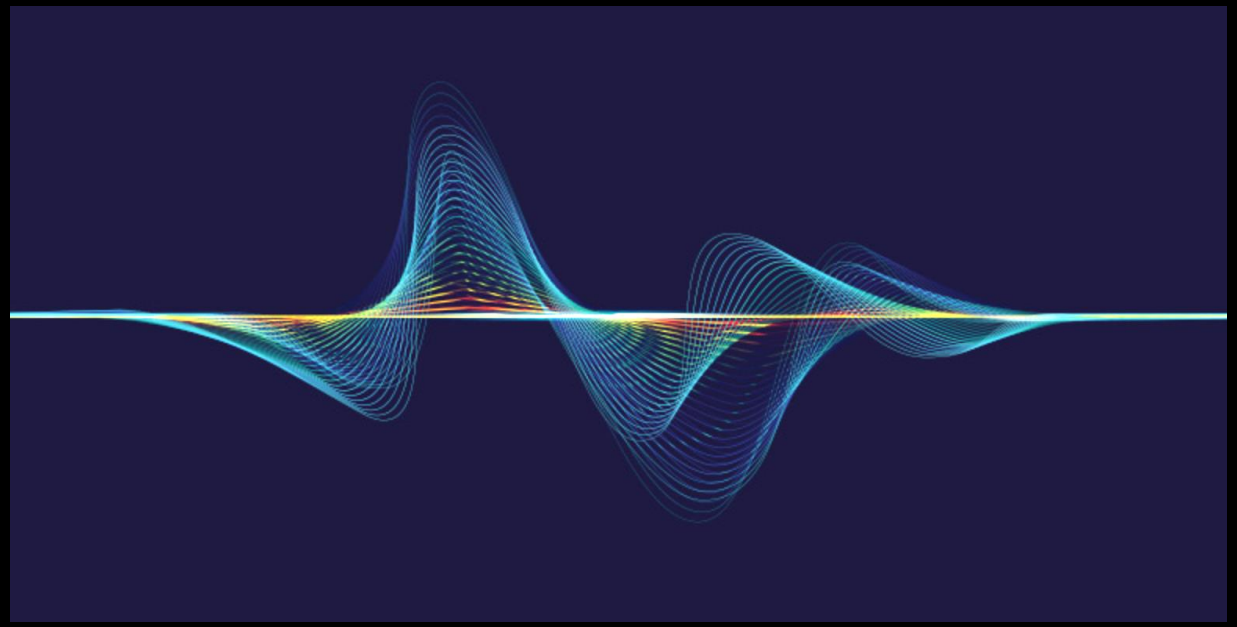
- Spatial audio capture
  - Novel microphone array topologies
  - Higher Order Ambisonics
  - Dolby Atmos content workflow



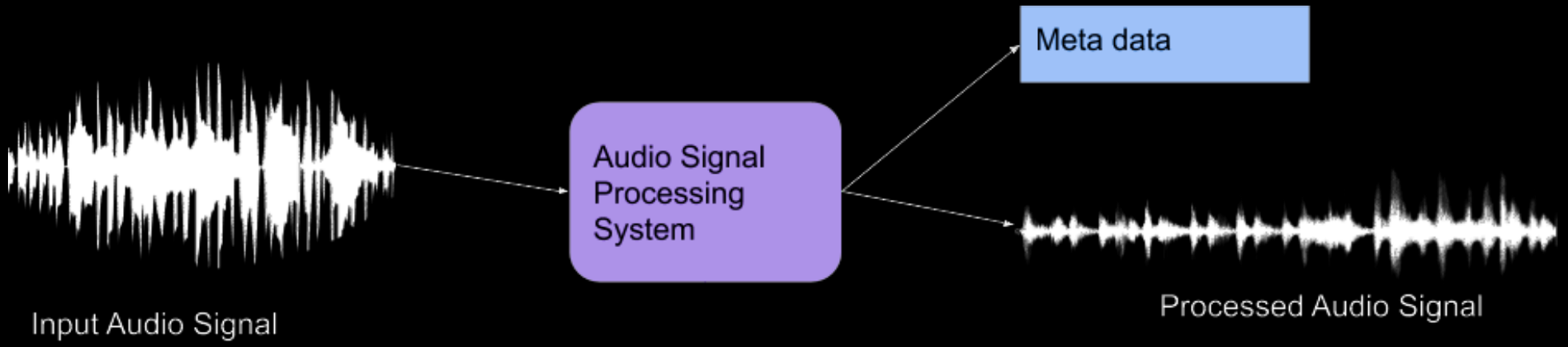
AUDIO CODING







AUDIO PROCESSING

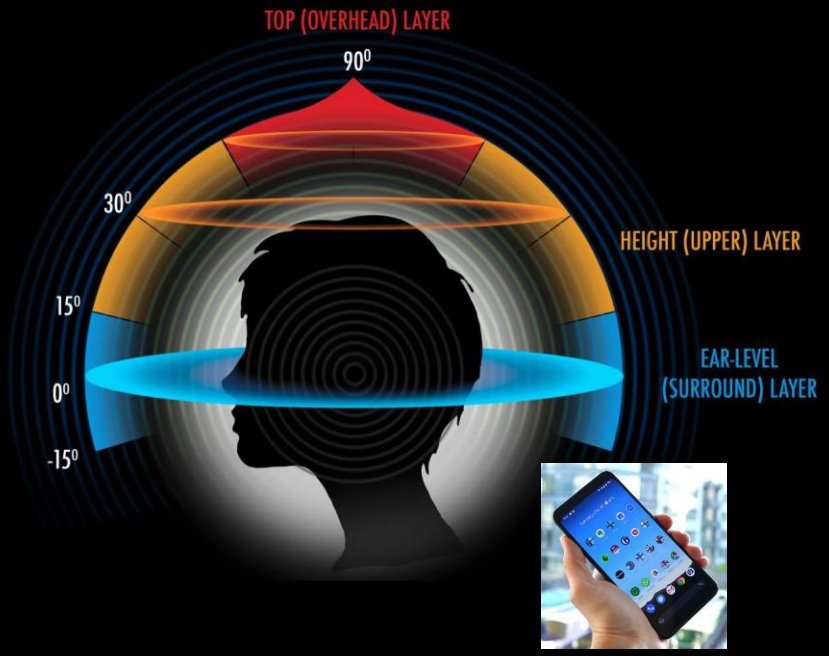


DATA ANALYTICS

- Understanding algorithm performance
- Measuring consumer engagement
- Improving performance and engagement

AUDIO RENDERING

- Speakers
- Smart speakers
- Headphones



GAME ENGINES

- Immersive Gaming
- Immersive audio for AR/VR/XR

IMMERSIVE EXPERIENCES

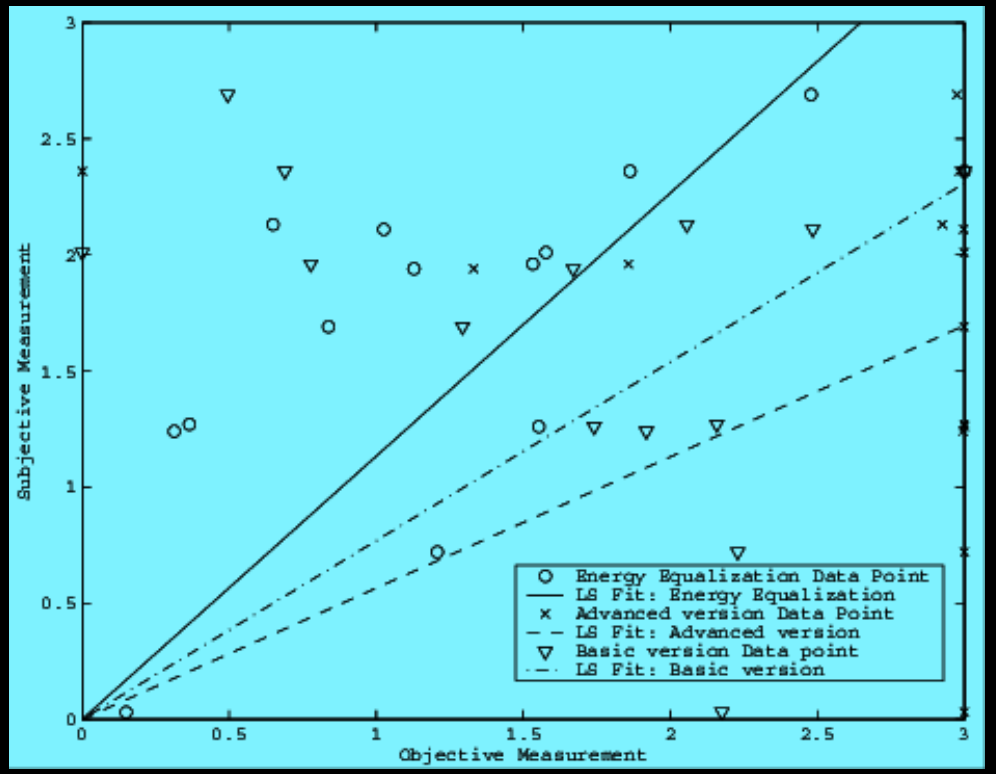
- Next Generation Immersive Experiences
- Entertainment
- Virtual Acoustics

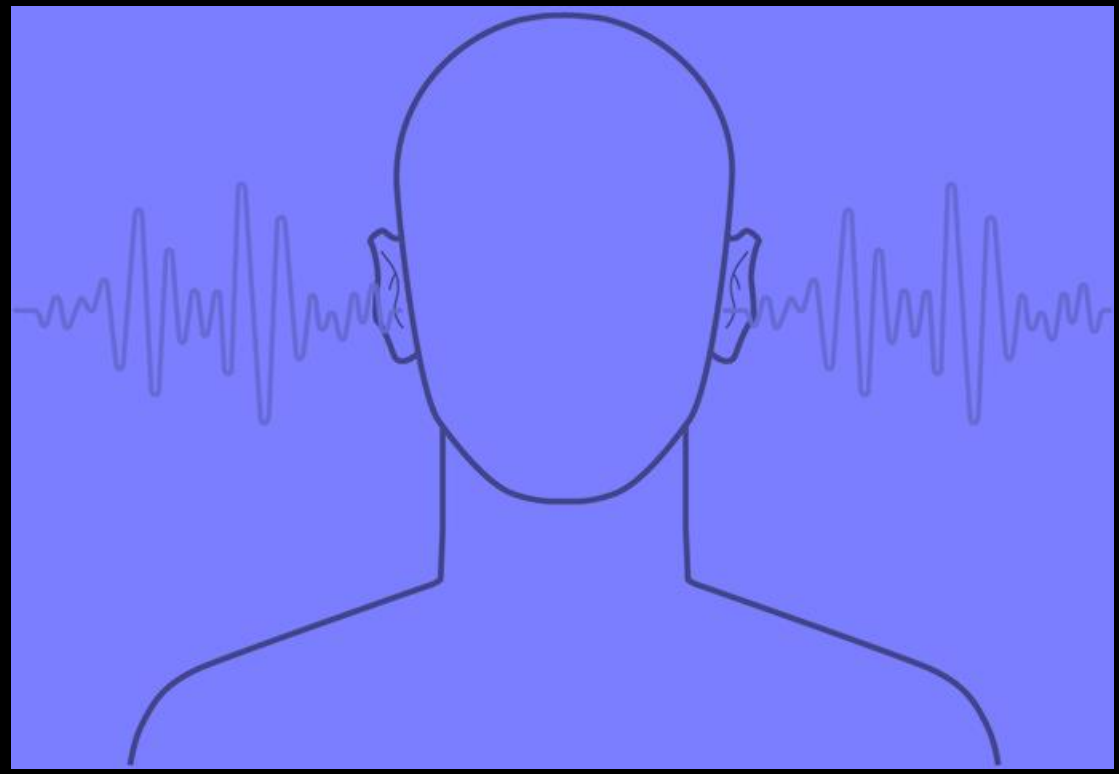
HUMAN PERCEPTION

- Psychoacoustics
- Cognition

OBJECTIVE QUALITY METRICS

- Machine-based Audio Quality Assessment
- Faster than Subjective Testing





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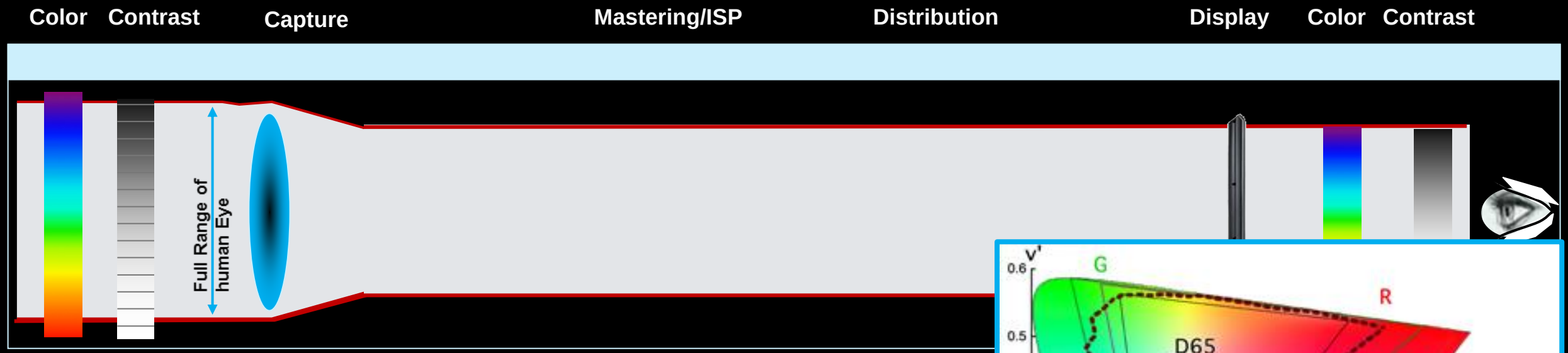
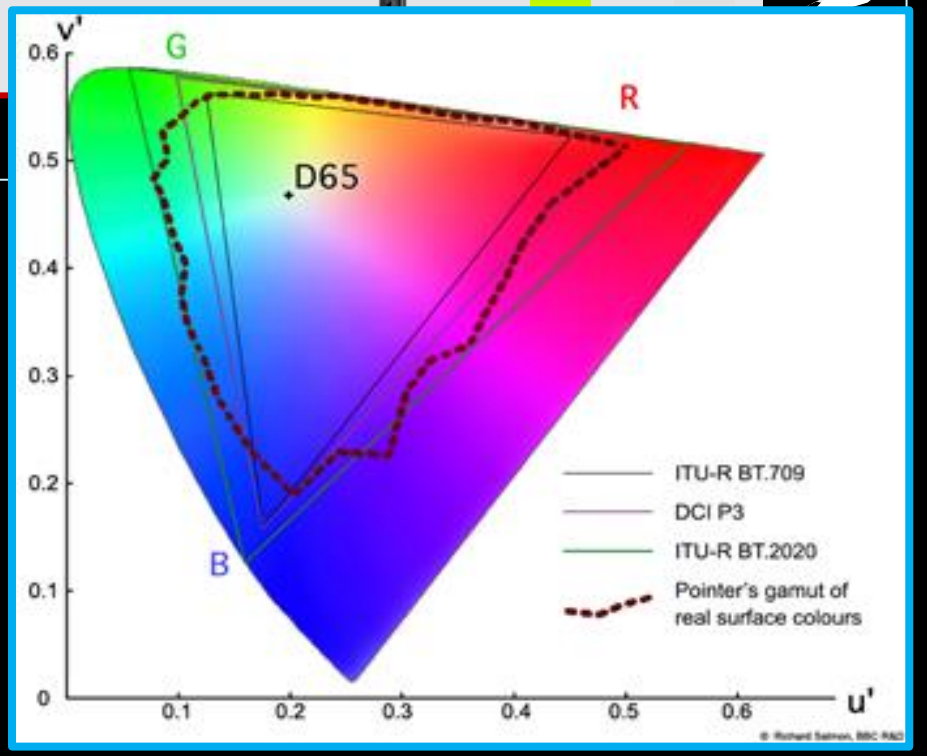
SDR => Dolby Vision: High Dynamic Range (HDR) & Wide Color (WCG)



Standard Dynamic Range (SDR) =
Dynamic Range of 0-100 nits & Rec-709 Color Gamut

Dolby Vision is an end-to-end ecosystem: from content creation, to distribution, to consumption =
Dynamic Range of 0-10000 nits & Rec-2020 Color Gamut




MORE
DYNAMIC RANGE

Dolby Vision Partnership Momentum

15+ TOP TV BRANDS
with Dolby Vision, available at all price points

15+ GLOBAL CONSUMER BRANDS ASIDE FROM TV
supporting Dolby Vision playback across device types

10+ STREAMING SERVICES
delivering Dolby Vision content

16000+ DOLBY VISION TITLES
released for the home

Areas of Interest for Imaging

Dolby Vision/HDR Capture

Higher-Order Image Capture and Processing

Novel Capture Systems and Processing

Deep Learning based Image/Video Processing

Image/Video Restoration

HDR Still Image Compression and Processing

Human Machine Interface

Volumetric Immersive Experiences (AR/VR)

Deep learning Video Compression

3D Scene Representation & Processing

Multimodal Representation and Processing

Vision and Psychophysics

Human Perception

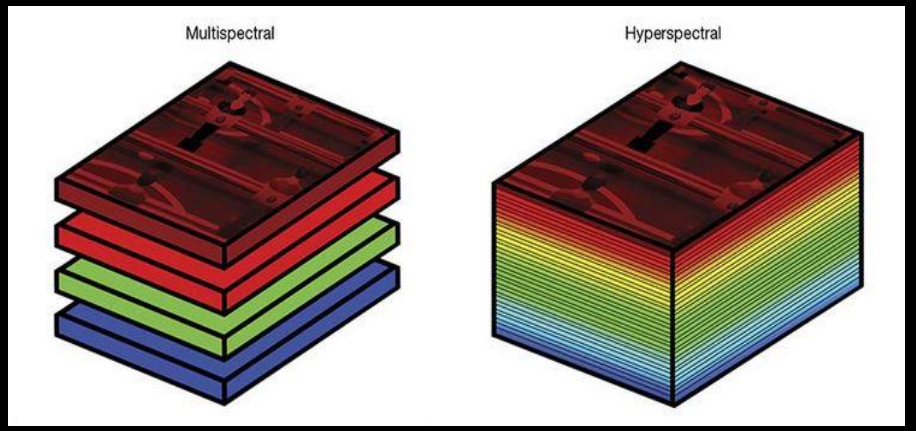
Video Quality Metrics

AR/VR Displays/Imaging Hardware

Personalization/Privacy/etc

Higher Order Image Capture + Processing

- Multi-spectral and hyper-spectral capture, processing
- Novel image signal representations
- Improved accuracy color transforms
- New 3A architectures and algorithms

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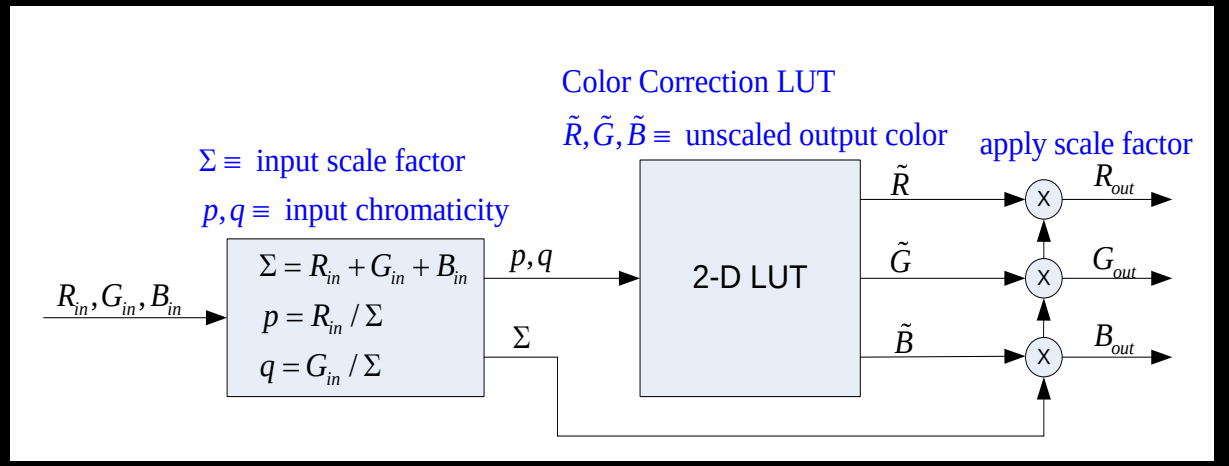


Novel Capture Systems + Processing

- Under-display cameras
- Event cameras
- New sensor architectures (dynamic range, frame rate)

Dot-Drop solution

Under-display Camera solution

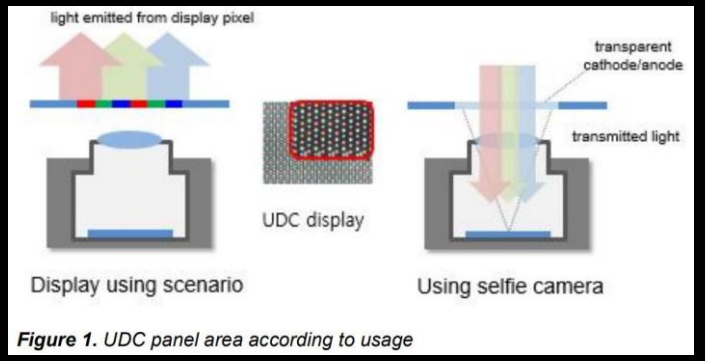
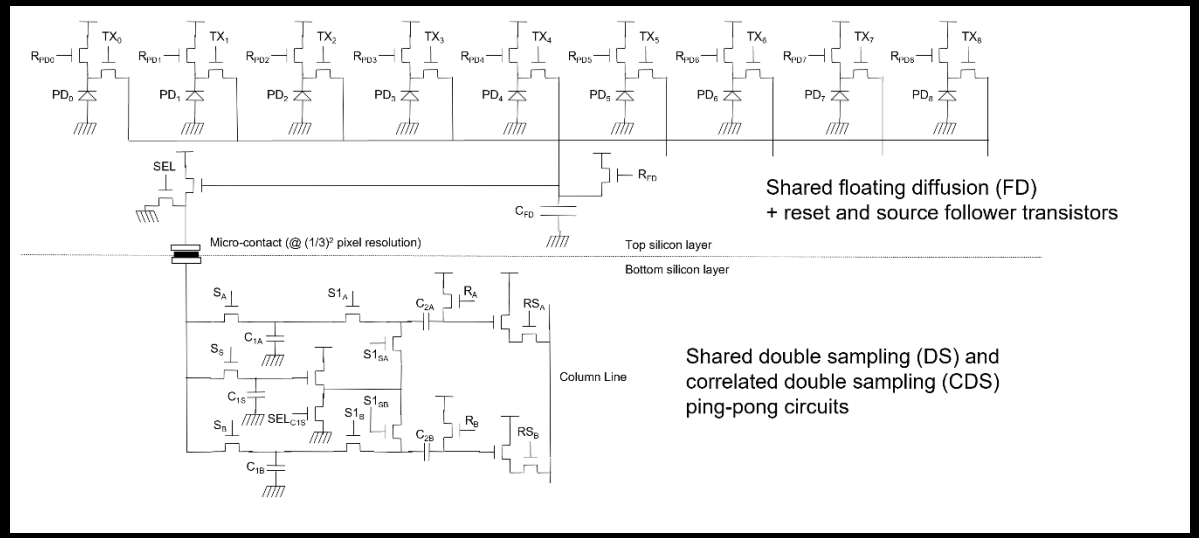


Figure 1. *UDC panel area according to usage*

Lee, et al, *Proc. IS&T Int'l. Symp. on Electronic Imaging: Imaging Sensors and Systems*, 2021, pp 68-1 - 68-5



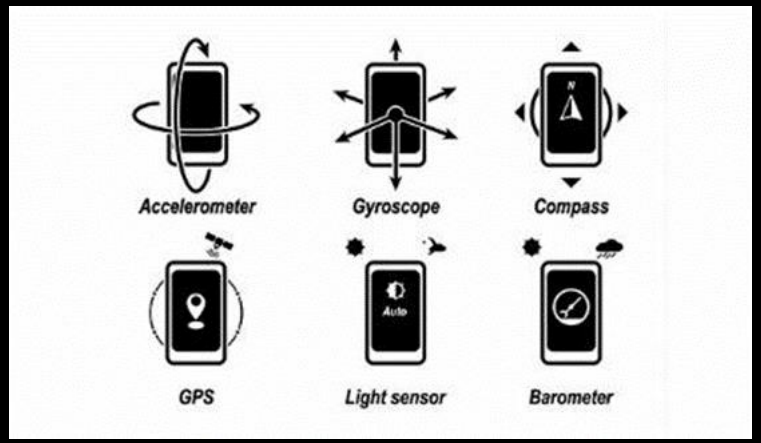
IEEE Spectrum, 20 Feb 2020

Deep Learning Video Processing

- Video Restoration and Video Enhancement
- Photo/Video Immersive Experience

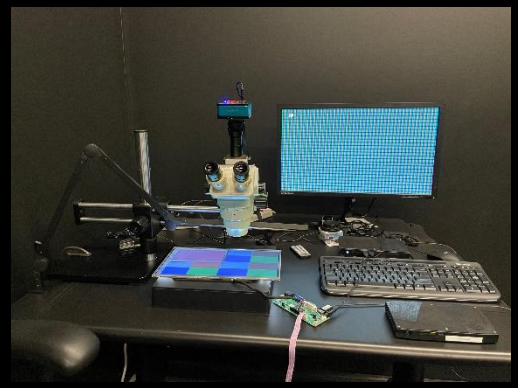
Human Machine Interface

- Enable interactivity and immersion
- Computer vision/sound understanding
- Camera, microphone, and sensor



Volumetric Immersive eXperiences

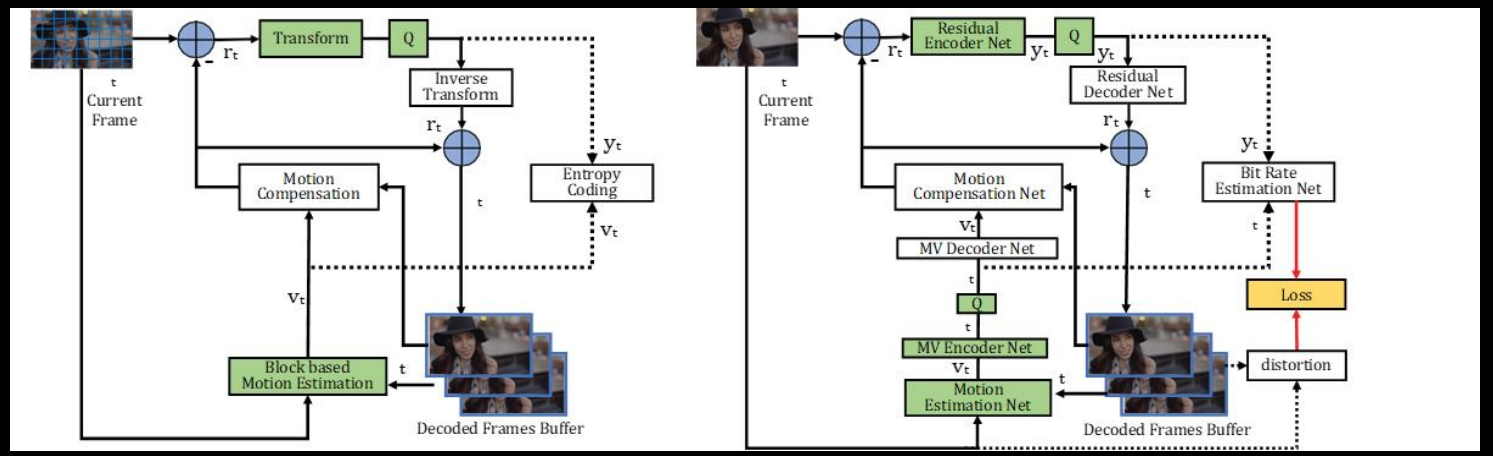
- Volumetric Capture
- Novel postproduction techniques
- Scene analysis
- Real time high frame rate novel view synthesis
- Volumetric codecs
- VR and AR HMD research
- Novel camera and display panel research



ViX

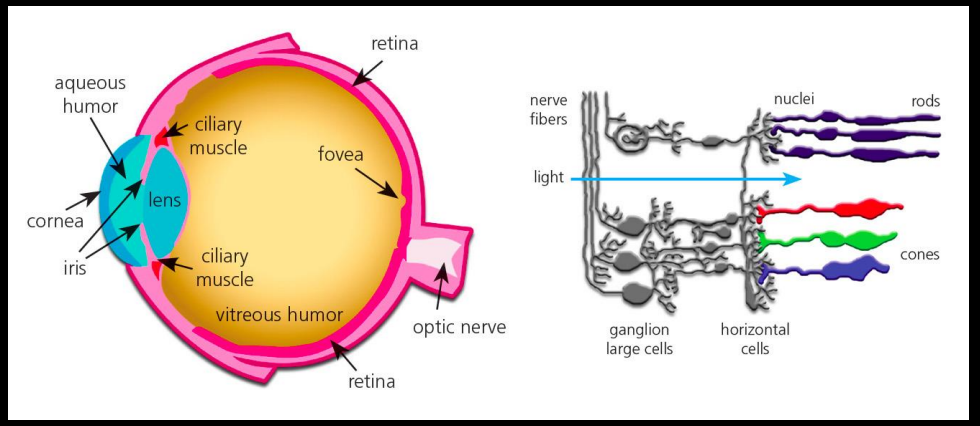
Deep Learning Video Compression

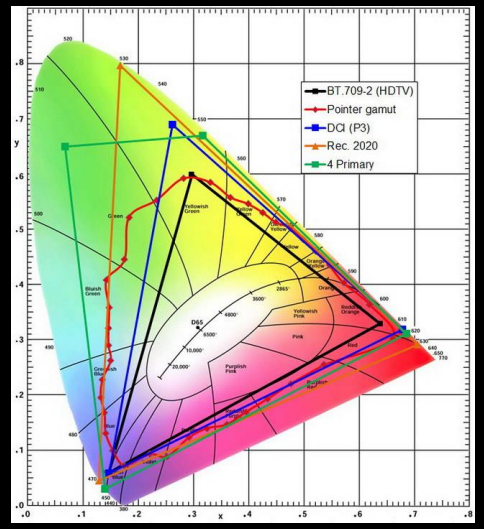
- Hybrid Approach
- End-to-end Approach
- 2D/Stereo/360/Volumetric Video

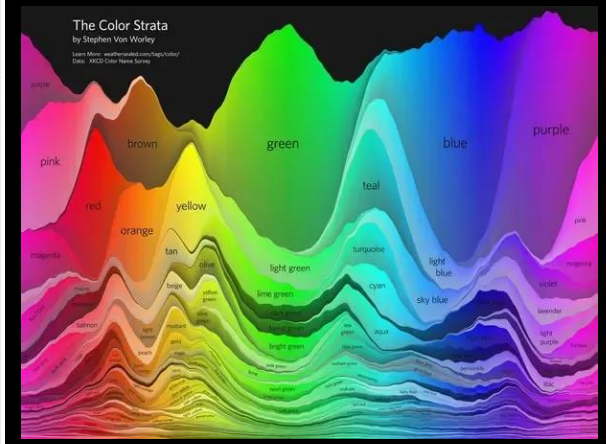


Vision and Psychophysics

- Viewer comfort and adaptation
- Multi-spectral display
- Color and frequency perception



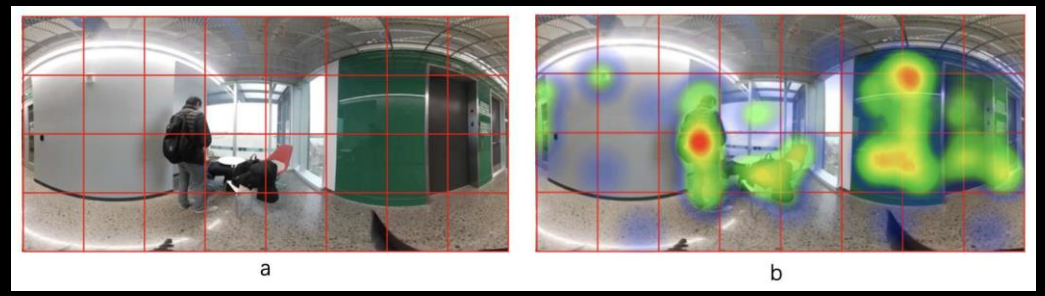




Royal Museum, Greenwich

Human Perception

- Deep Learning based perception modeling
- Complete "experience" modeling
- Multi-illuminant adaptation



Royal Museum, Greenwich

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Areas of Interest for Networking & Cloud

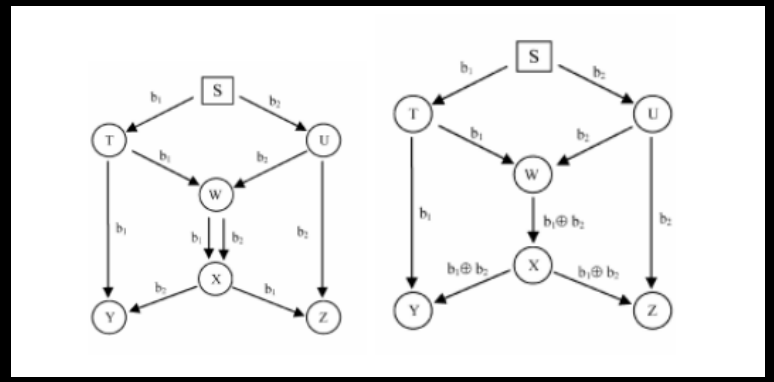
Application Areas

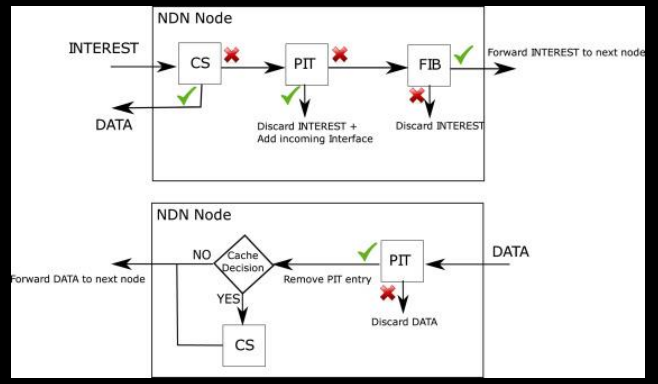
- Streaming Media
- Networking Protocols
- Software-Defined Networks & Virtualization
- Data-driven Media Experience Management
- Distributed Compute & Storage

Research Areas

- Network and Channel Coding
- Advanced Networking Protocols / Content-centric Paradigms
- Decentralized / Distributed Systems and Compute
- Dynamic System Identification & Control (via DNN)
- Sparse Modeling / Sensing
- E2E Insight / Performance Measurement

Info Theory & Coding, Protocols & Paradigms





IPFS

Network Coding

Source Coding

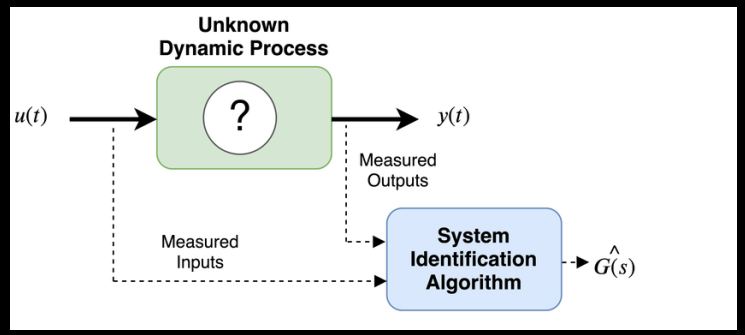
Channel Coding

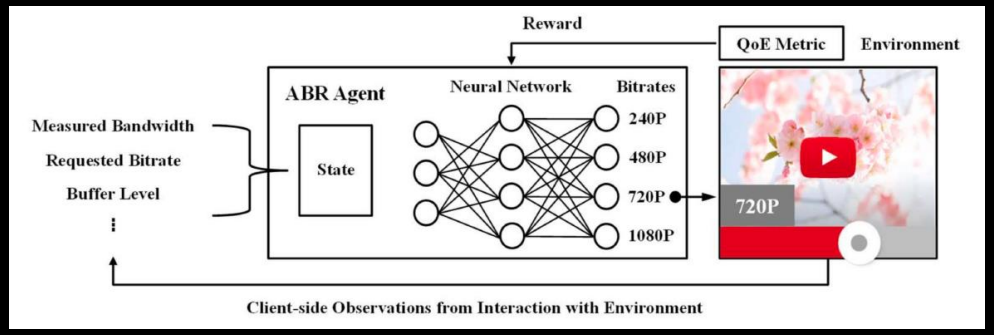
HLS

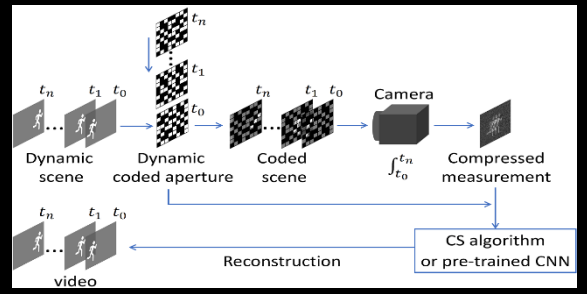
mpeg-DASH

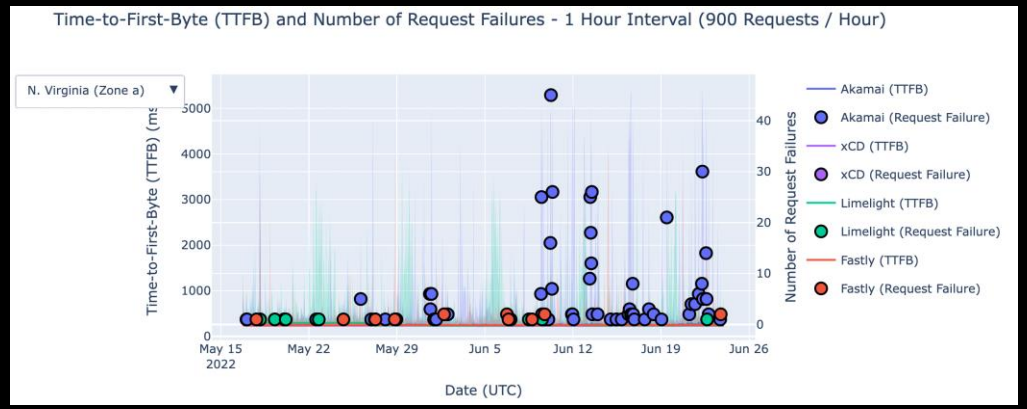
WebRTC

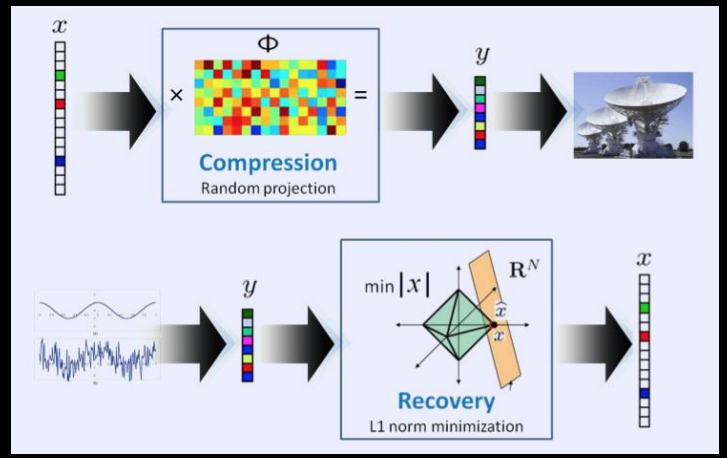
Dynamic System Identification/Control, Sparse Sampling

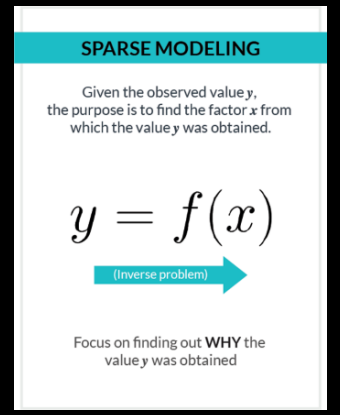












Dolby

Q&A