Advancements in Mobile Visual Processing with Qualcomm® Snapdragon™ Mobile Platforms

The foundation for superior mobile visual processing

Powering cutting-edge, next generation visual experiences

Immersive virtual reality

Superior camera experiences

High definition video

High performance 3D Graphics

Intuitive augmented reality

Snapdragon Mobile VR 835 Platform

Truly mobile XR

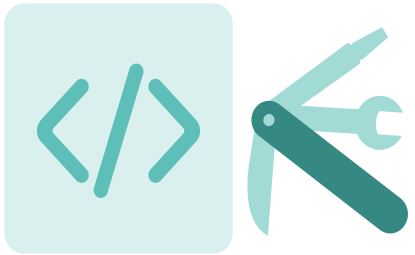
- High performance, amazing content
- No wires, and no PC required

Significant progress in XR this year

Improving experiences with Snapdragon 835

Snapdragon 835

Purpose-built mobile processor for superior XR experiences

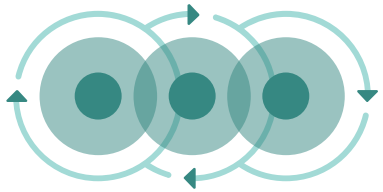


Snapdragon VR SDK

Easy developer access to Snapdragon accelerated XR libraries that simplify application development

HMD Accelerator Program

Reference designs, working with ODMs and technical support to commercialize XR HMDs quickly

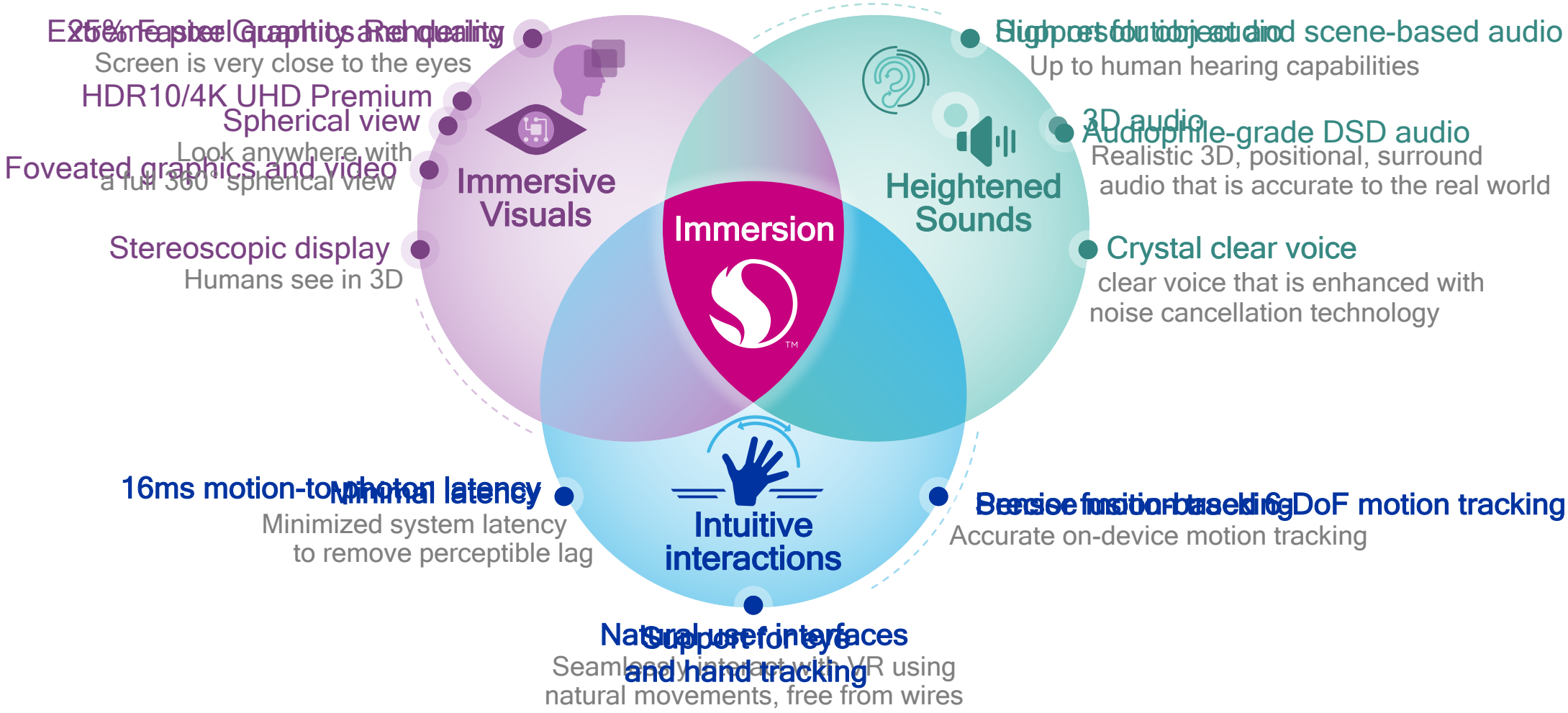


Ecosystem support

Working with multiple content, technology and platform companies

Snapdragon 835 mobile platform takes us closer to the vision

Designed to meet VR processing demands within thermal and power constraints



Snapdragon 835 VR Development Kit

Advanced VR features designed to optimize applications and simplify development

System on Chip (SoC)

Snapdragon 835 mobile platform

Memory

DRAM: 4GB LPDDR4

Flash: 64GB UFS

Display

AMOLED WQHD

~2MPix per eye

Cameras & Other Sensors

Six degrees of freedom (6DoF) motion tracking:

- Two monochromatic, one mega pixel (1280x800) global shutter cameras & fisheye lens
- Inertial measurement unit with fast interface to Snapdragon 835 integrated sensor core

Eye Tracking:

- Two monochromatic VGA global shutter cameras

Connectivity & IO

Wireless: Wi-Fi, Bluetooth

Other: USB3.1 type C (power)

Handheld controllers

Audio

Integrated WCD9335 CODEC

HMD Accelerator Program Update

Commercialize VR HMDs quickly with fewer resource restraints

HMD Accelerator Program

Commercialization

Allow OEMs to quickly design and manufacture standalone VR HMDs

High Quality

Provide means for OEMs to track performance, monitor KPIs and promote them

Scale & Harmonization

Standardizes a platform for the whole value chain to build on top and garner critical scale for VR to flourish

Actively working with XR device manufacturers

XR products based on Snapdragon Mobile VR Platform

VR HMD

Baofeng Matrix

VR HMD

Coocaa Wondergate G1

VR HMD

iQiyi Adventure

Tango and Daydream

ASUS Zenfone AR

Daydream

Google Pixel

Daydream

Google Pixel XL

Tango

Lenovo Phab 2 Pro

VR HMD

Pico Neo

VR HMD

WhaleyVR

AR Glasses

ODG R8/R9

Daydream

ZTE Axon

Daydream

Moto Z

Gear VR

Samsung Galaxy S8

Gear VR

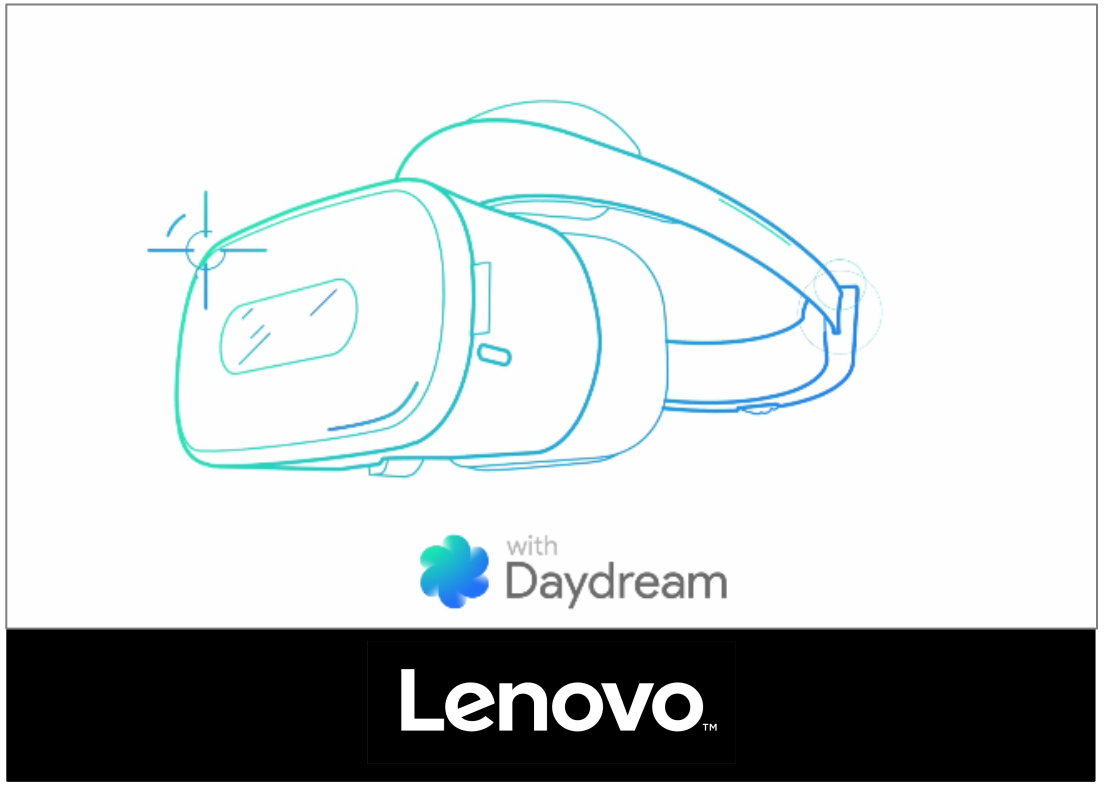
Samsung Galaxy S8 Edge

20+
Devices launched

20+
Devices in development

Jointly fostering the ecosystem of standalone mobile VR

Daydream + QUALCOMM®




STANDALONE VR
COMING TO CHINA
Powered by VIVEPORT | Qualcomm snapdragon

Introducing:
Spectra™ Module Program

Qualcomm Spectra is a product of Qualcomm Technologies, Inc.


snapdragon

Qualcomm Spectra Module Program

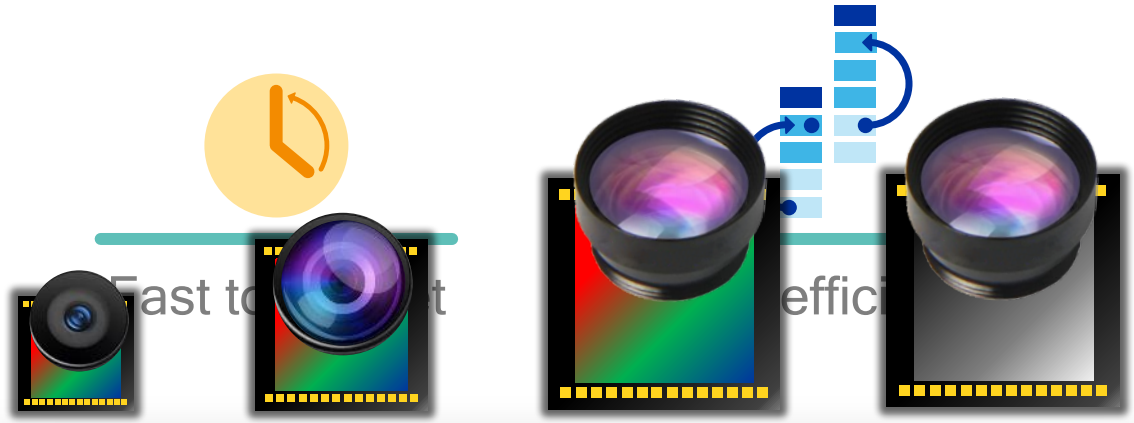
Camera module for Snapdragon devices

Leading image quality

Fast t… …t

…effici…

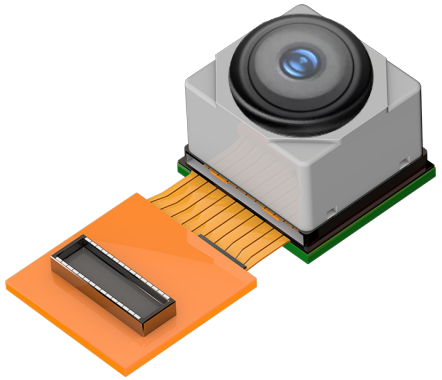
Competitive pricing



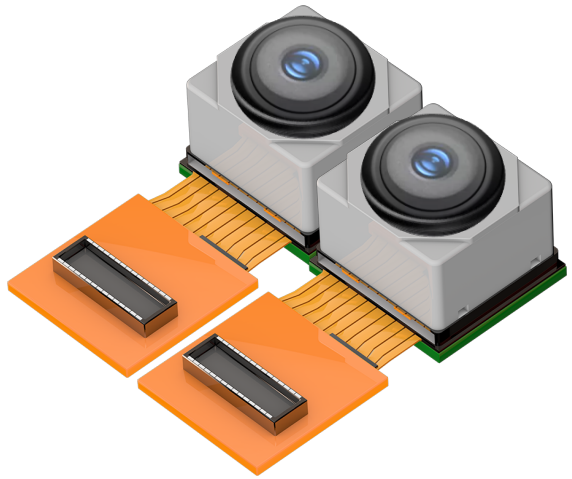
Qualcomm Spectra Module Program

Camera module for Snapdragon devices

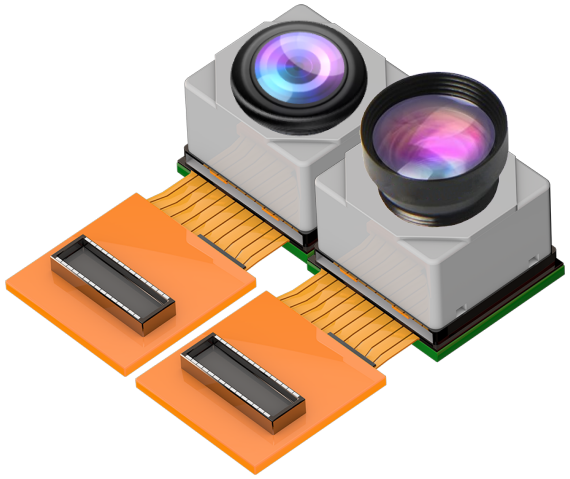
16MP PDAF
Sony IMX298



Qualcomm® Clear Sight™ camera features
Fusion of Mono + Bayer



Optical Zoom
Wide-angle + Telescopic 2x

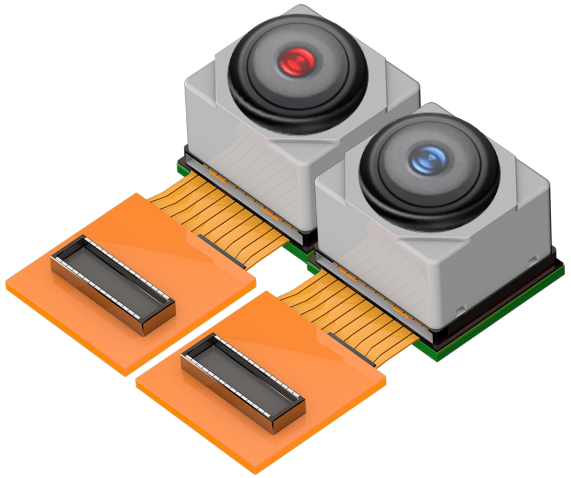


Qualcomm Clear Sight is a product of Qualcomm Technologies, Inc.

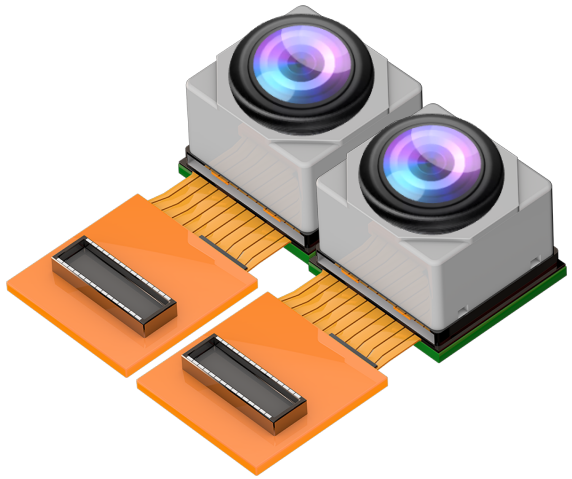
Qualcomm Spectra Module Program

New for 2017

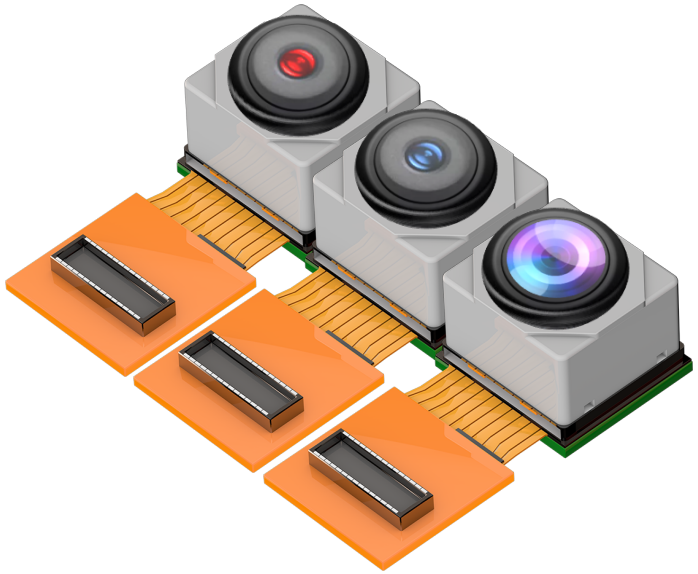
Iris Authentication
Always-on Security



Entry-Level Computer Vision
Passive Depth Sensing

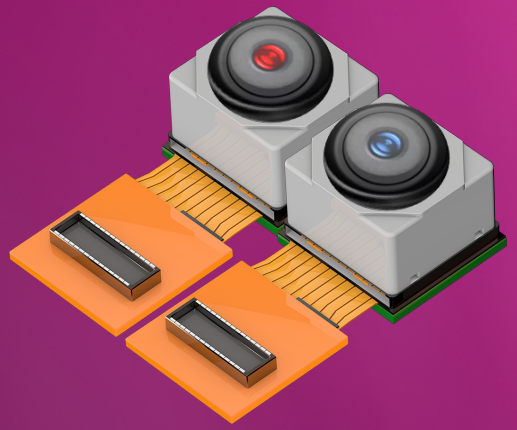


Premium Computer Vision
Active Depth Sensing



Iris Authentication Camera Module

Reliable biometric iris-recognition for Snapdragon smartphones and mobile PCs



- Software + OV2281 1920×1080 1.12µm 10bit front facing IR sensor module
- Industry leading 40ms, low power iris scanning that works through most sunglasses
- Liveness detection algorithms won't be fooled by 2D images or 3D molds
- Security-rich and isolated iris data via Qualcomm® Mobile Security

Qualcomm Mobile Security is a product of Qualcomm Technologies, Inc.


Thur Dec 06
58°F
6:20

Depth Sensing

Unlocks the next leap in image quality, XR and security

Image quality enhancements including Bokeh

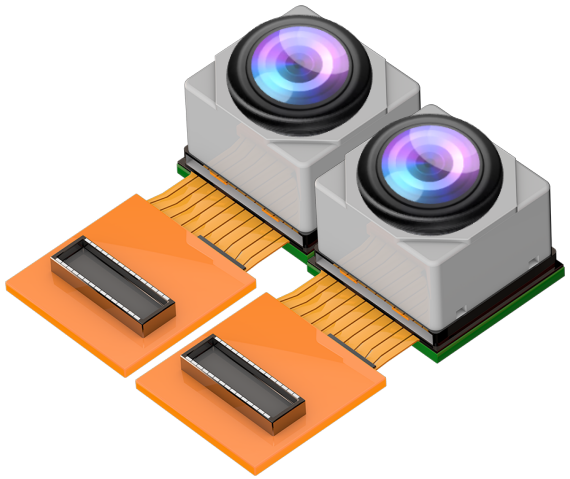
XR experiences

Facial scanning for additional liveness security

Qualcomm Spectra Module Program

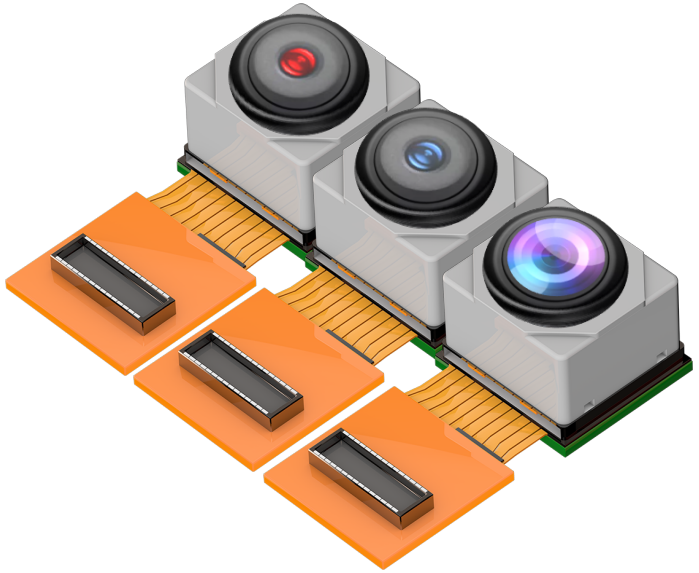
Computer Vision Cameras

Entry-Level Computer Vision
Passive Depth Sensing



Bringing depth sensing
to Snapdragon value tier devices

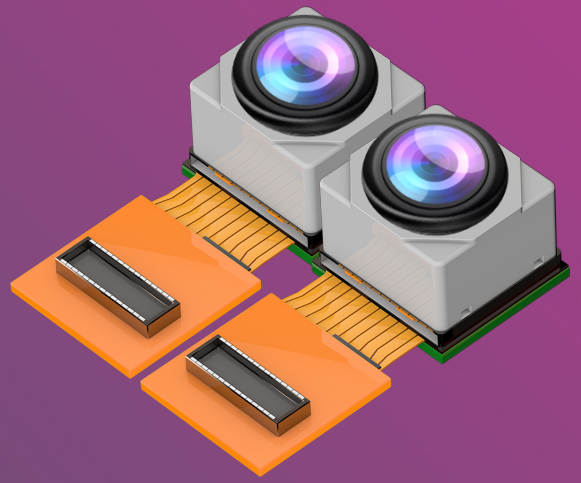
Premium Computer Vision
Active Depth Sensing

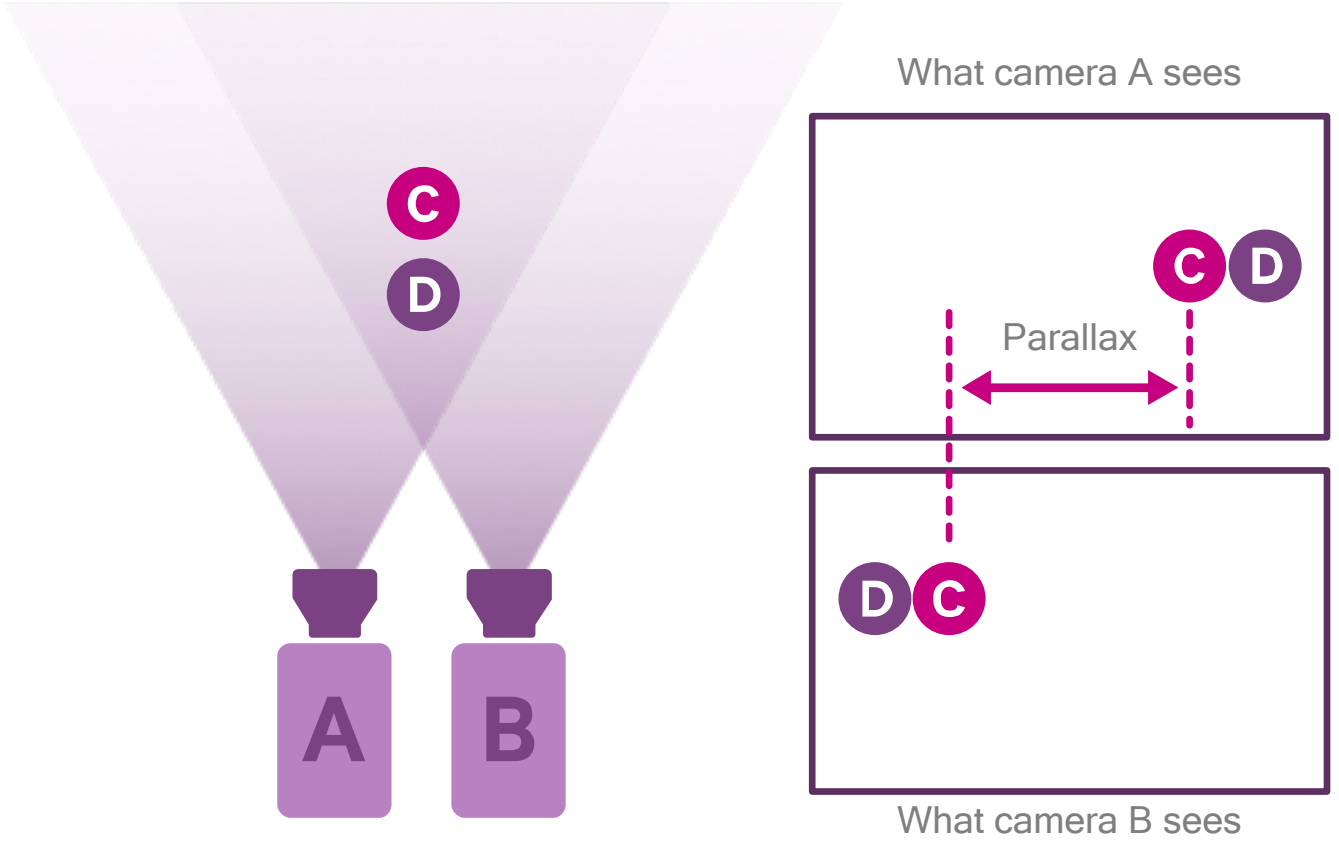


Premium depth sensing: precise, high resolution,
low power depth map generation

Passive Depth Sensing Camera Module

Bringing depth sensing to Snapdragon value tier devices



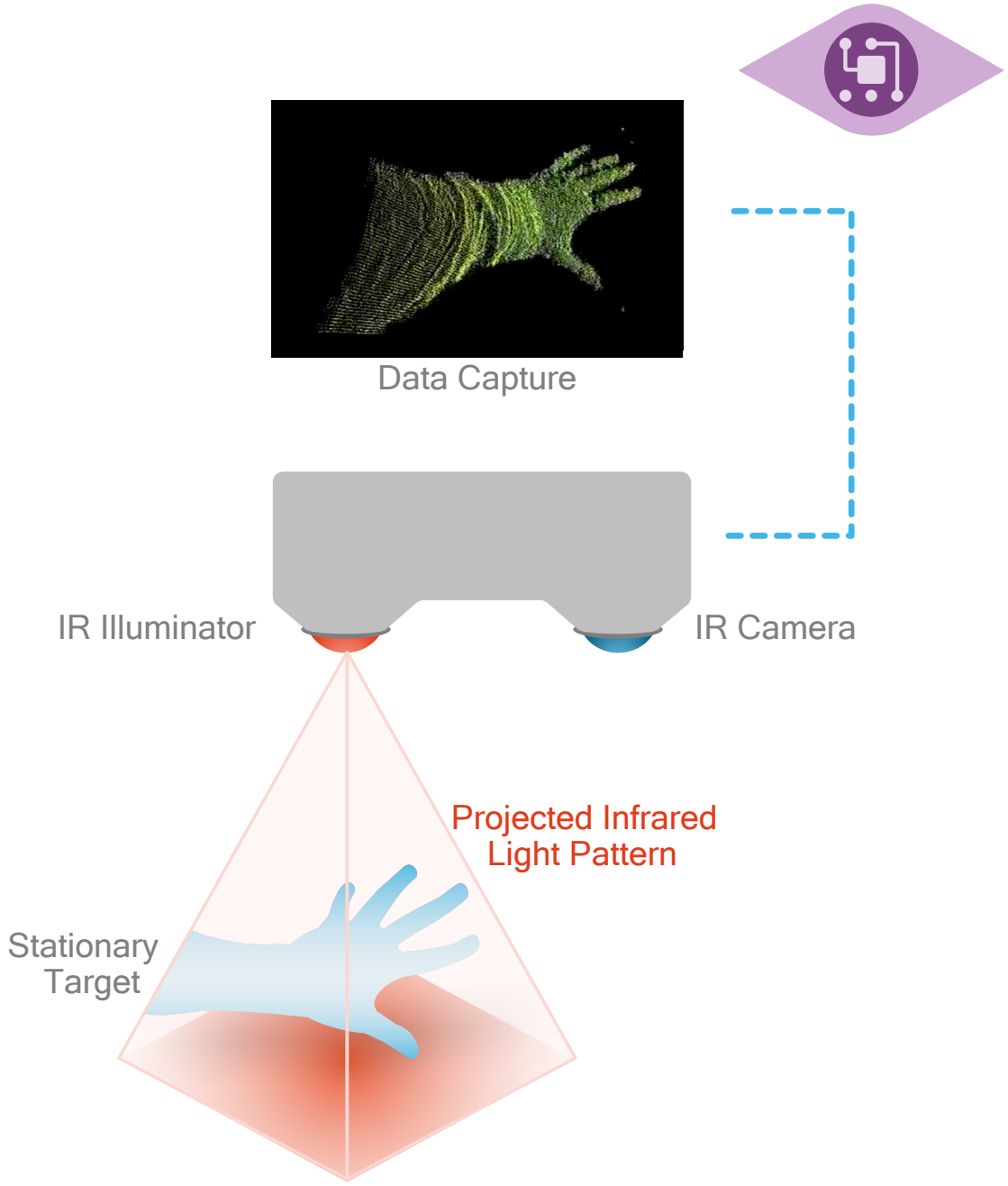


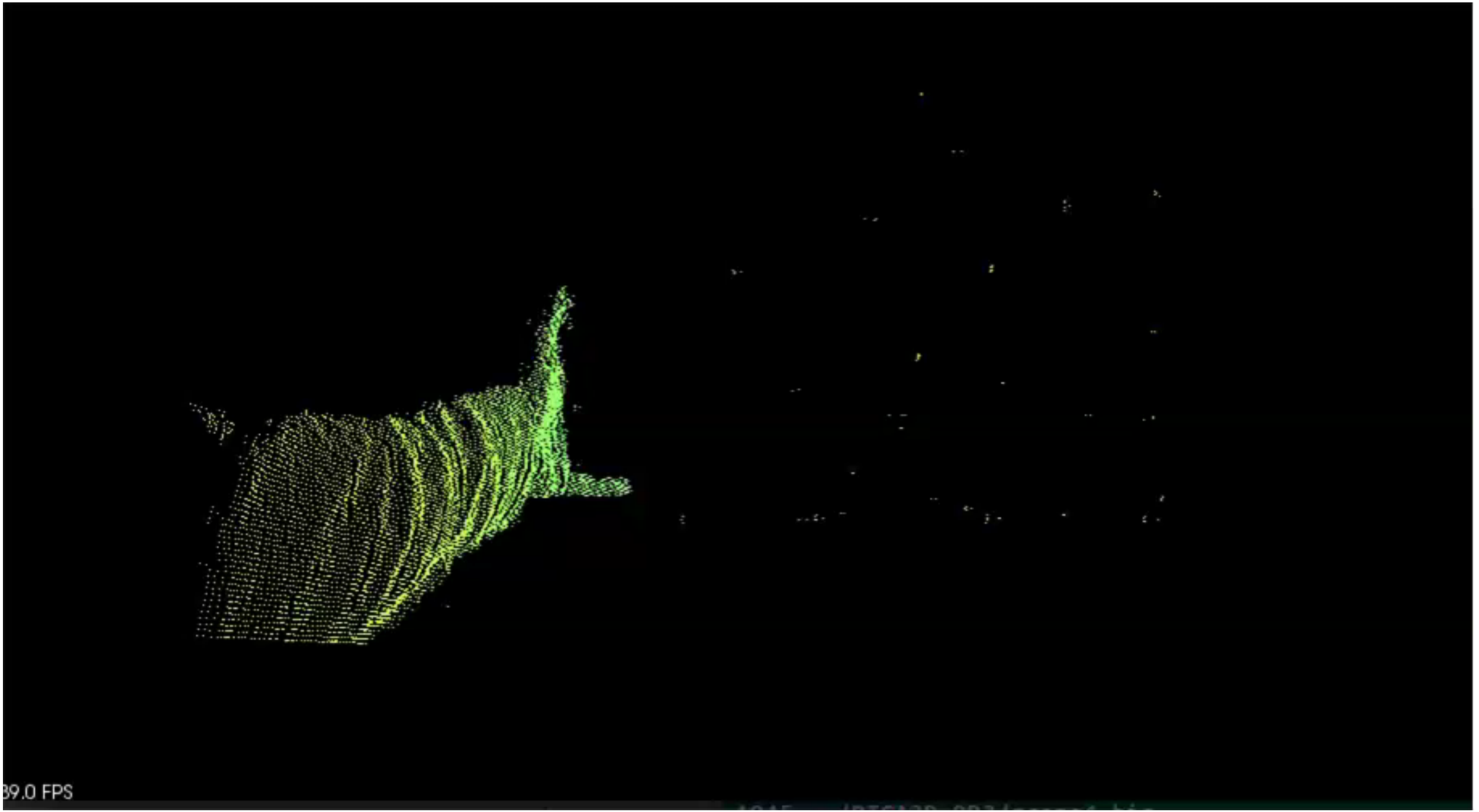
Active Depth Sensing

Utilize **projected IR pattern** to infer 3D depth

Utilize **high resolution depth map** for:

- More accurate face detection, recognition and authentication
- 3D reconstruction of objects even in low light environments
- Allows even more accurate simultaneous localization and mapping

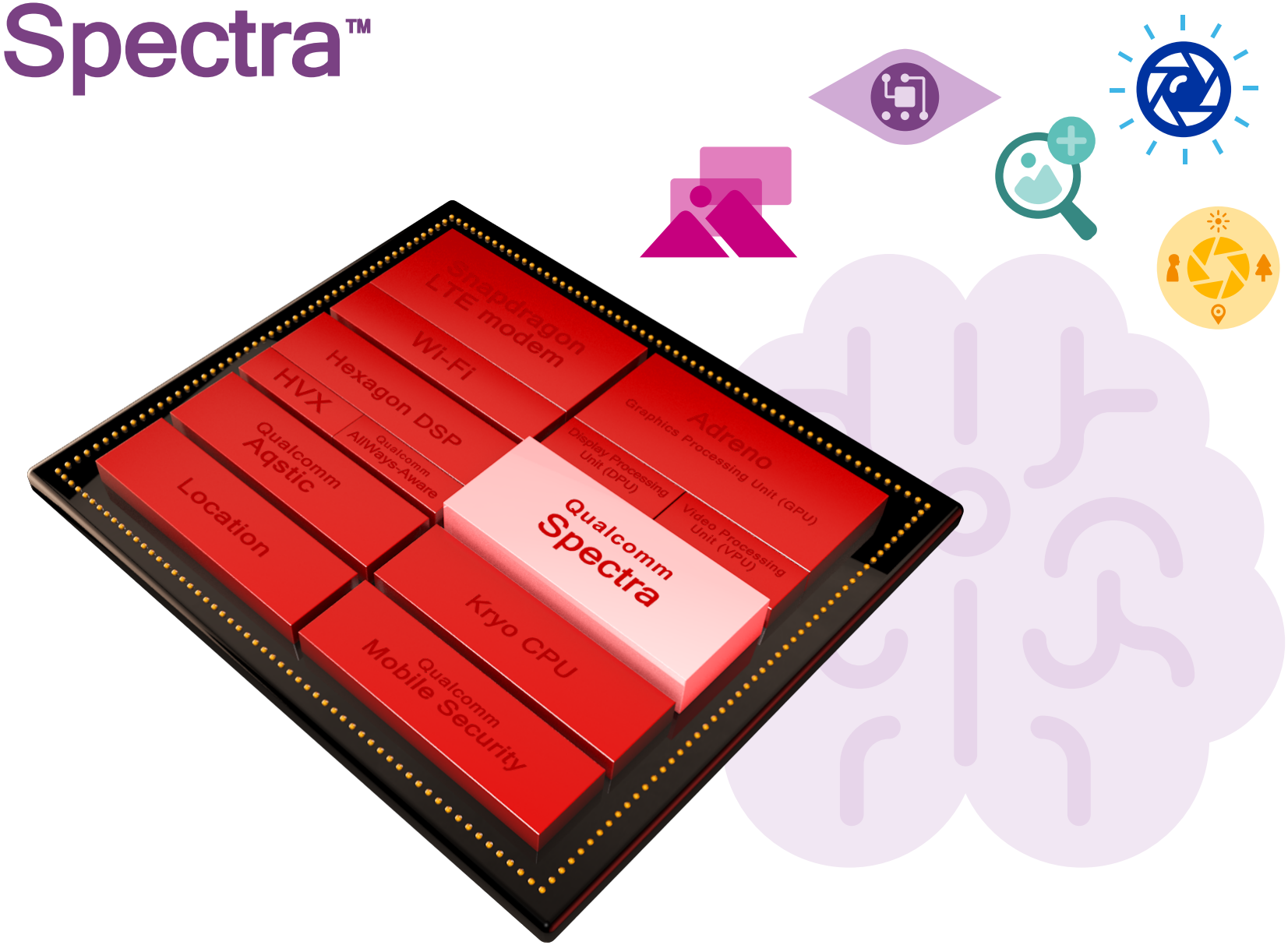


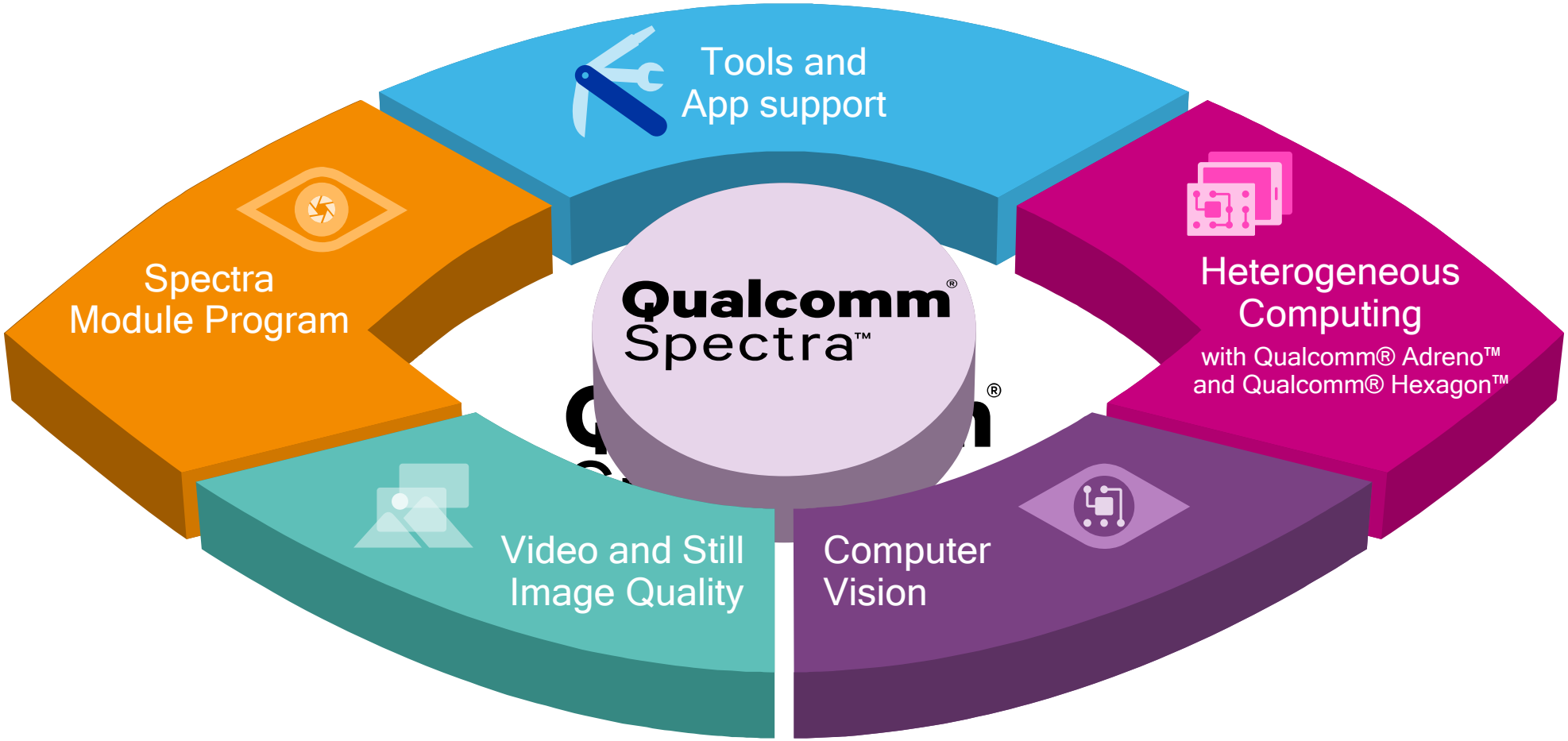

39.0 FPS

Qualcomm Spectra™ Image Signal Processor (ISP)

Qualcomm Spectra™

Superior image processing and computer vision




Tools and
App support
Spectra
Module Program
Qualcomm®
Spectra™
Heterogeneous
Computing
with Qualcomm® Adreno™
and Qualcomm® Hexagon™
Video and Still
Image Quality
Computer
Vision

Qualcomm Spectra 2nd Generation

Superior photo capture with multi-frame noise reduction

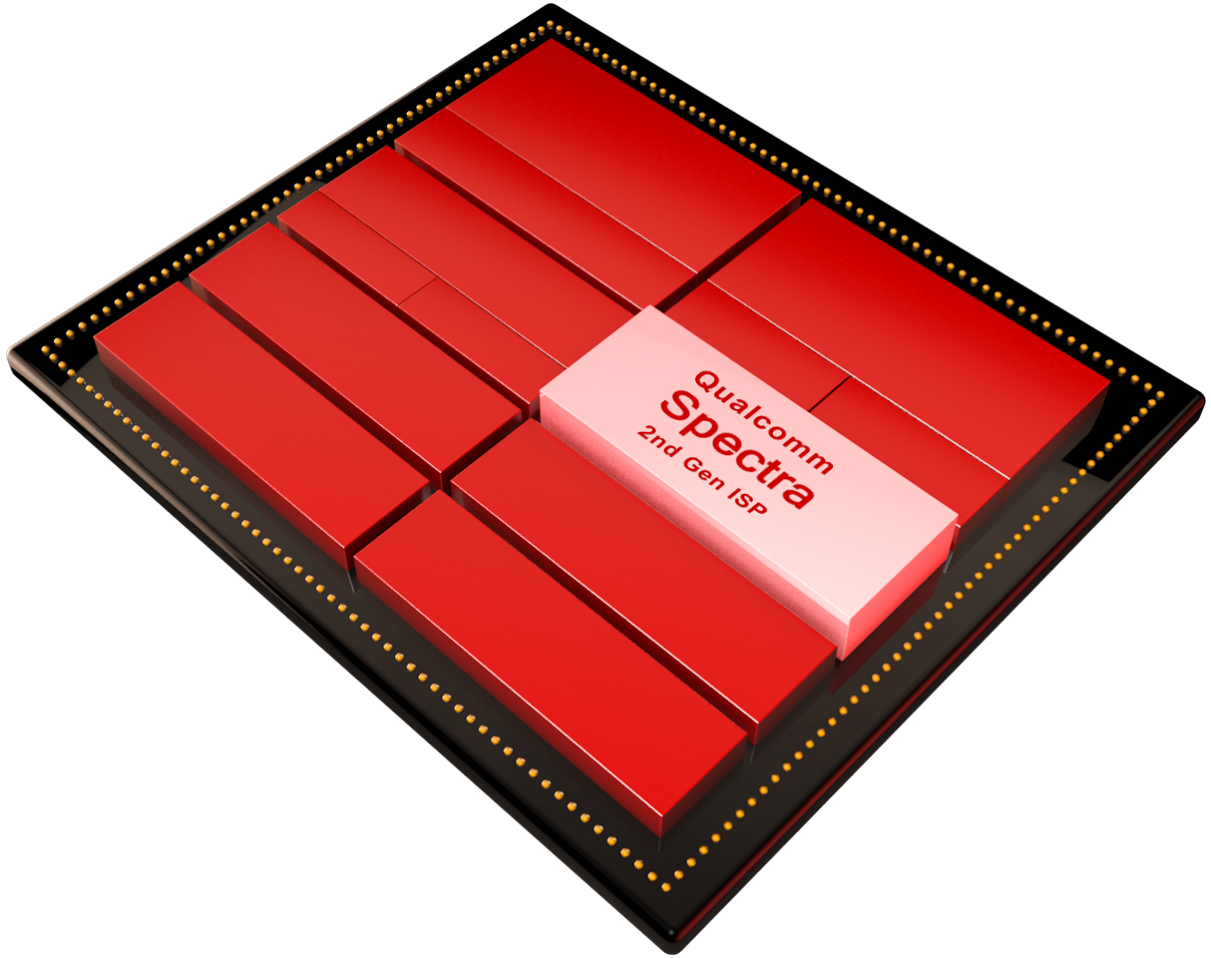
Video capture with motion compensated temporal filtering

Accelerated electronic image stabilization

Machine learning accelerated computer vision for face detection, bokeh photography and more

Simultaneous localization and mapping (SLAM) for XR

Additional undisclosed features to be announced later this year



Multi-Frame Noise Reduction

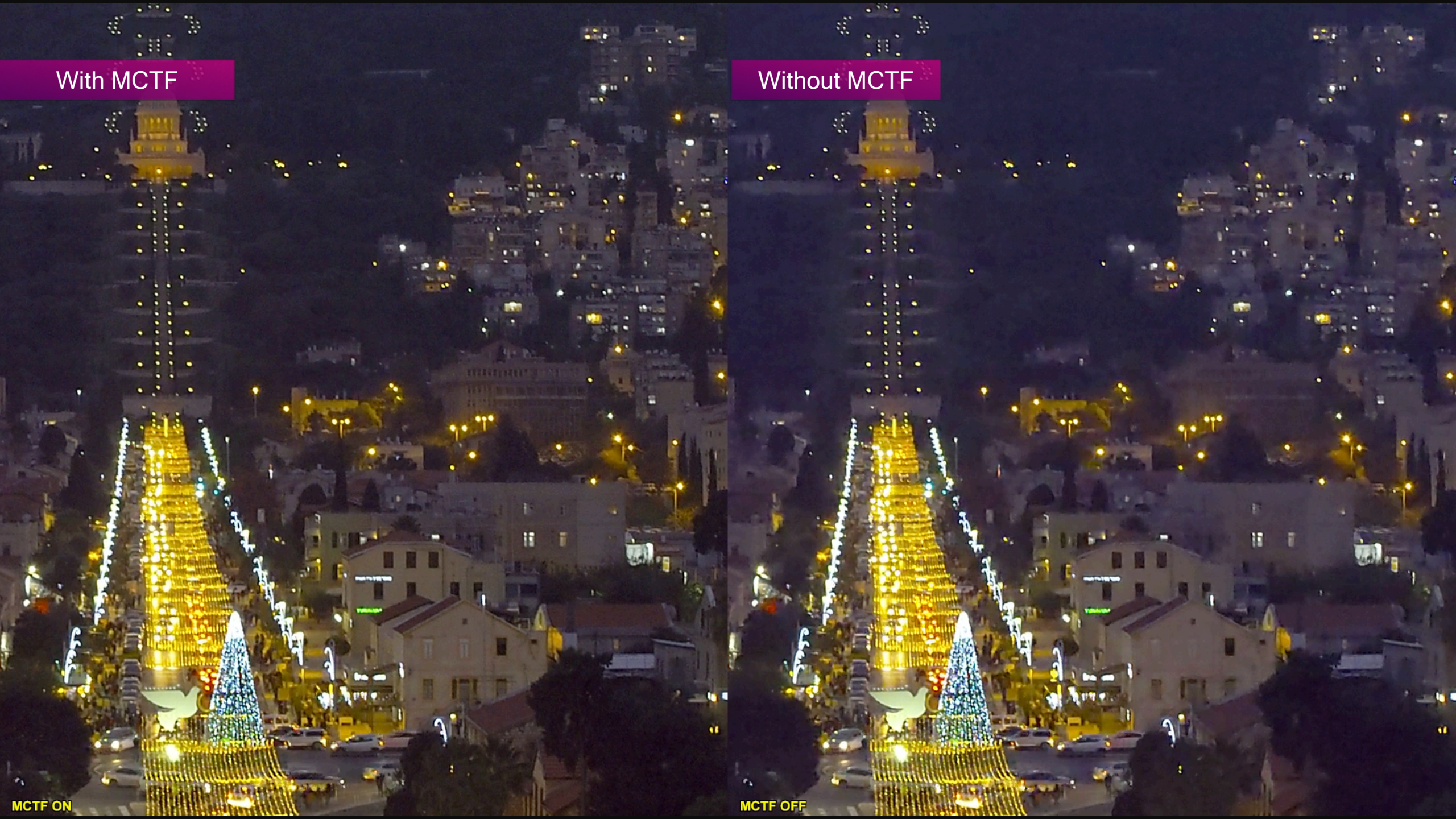
Superior photo image quality with multi-frame noise reduction

Noise reduction from filtering & blending multiple frames

Video Capture with MCTF and Accelerated Electronic Image Stabilization (EIS)

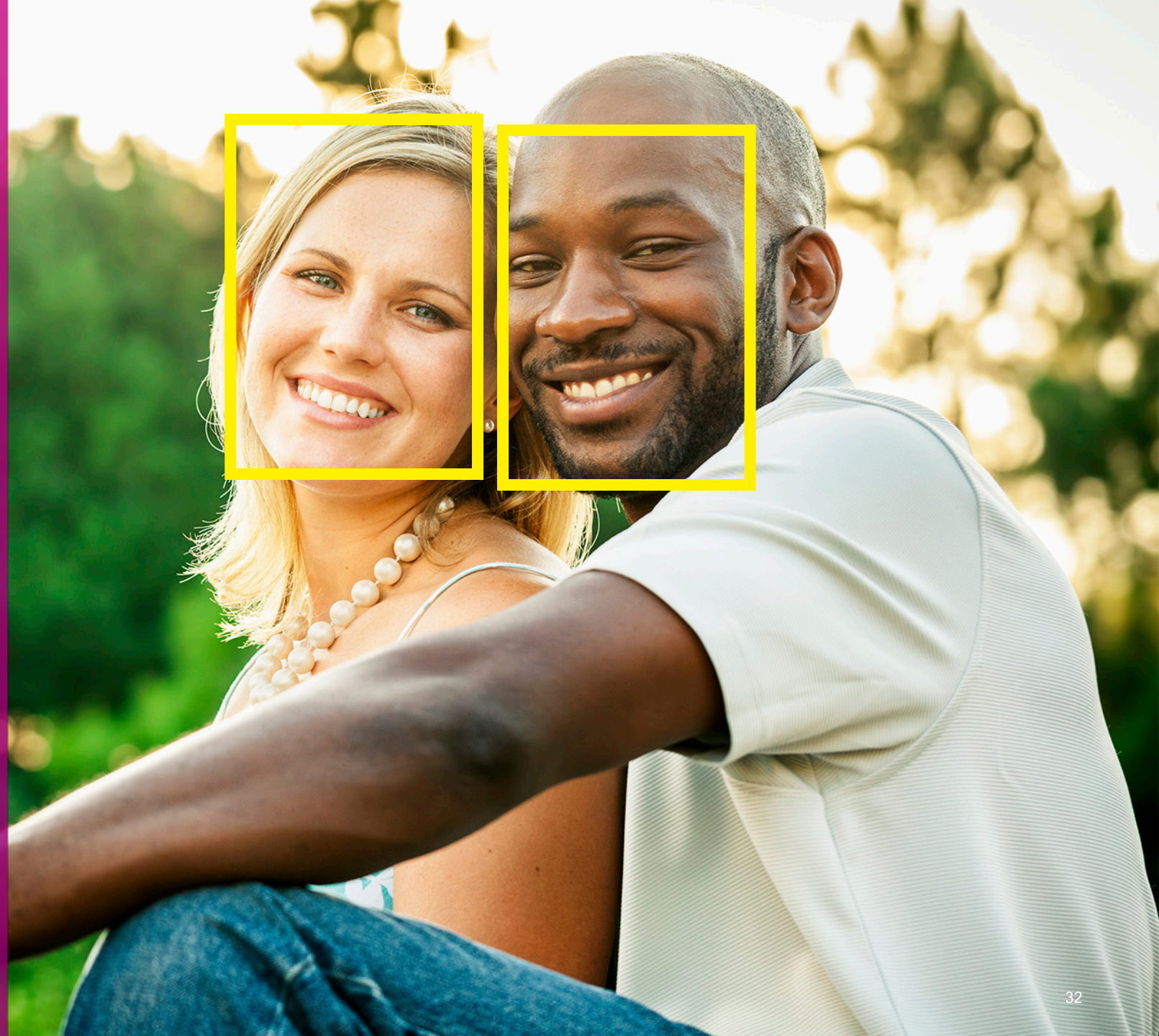
Improved video capture quality with **motion compensated temporal filtering** (MCTF)

Accelerated electronic image stabilization (EIS) to reduce unwanted vibrations when recording videos


With MCTF
Without MCTF
MCTF ON
MCTF OFF

Computer Vision

Machine learning accelerated computer vision for advanced use cases like face detection and improved computational photography



6DoF VIO / SLAM

Taking immersive mobile XR experiences to the next level:

Improved head/body motion tracking

- User friendly, inside-out 6DoF head tracking
- Power efficient, sub-16ms motion to photon
- Functional at room scale with capability to appropriately alert for collision avoidance

Simultaneous location and mapping (SLAM)

- Construct 3D map of environment & accurately track location through it
- Qualcomm Technologies is developing a SLAM that builds off our 6DoF VIO with minimal drift and positional jitter

Thank you

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