Speaker

Bill Orner, Director of Advanced Hardware for GoPro (www.GoPro.com), a manufacturer of sports video cameras. Mr. Orner’s 30 years in the CE industry includes working for Philips, Transmeta, MIPS, Lexicon as well as several startup companies. He has a BSEE from Northeastern University and a MSTEM from Pepperdine University. Mr. Orner is a member of the IEEE and SMPTE, he currently serves as the secretary of the IEEE CE Society and also involved with standards committees for CTA, USB and VESA.
Housekeeping

• Comments made are the views of me (Bill Orner) and do not express the opinions of IEEE or any company.

• This presentation is not an endorsement of any product. Consult you tax adviser before investing.

• Mostly covered Image Capture devices.

• Slides will be posted online soon.
Welcome to CES!

$16
Intro - AR vs. VR

- AR - Augmented Reality
- VR - Virtual Reality
- AR takes less hardware.
- VR takes lots of hardware.
- Badly done VR can make a user ill by disrupting their human control systems.
Spherical Cameras – Many Sensor

- More than 2 sensors/lens to capture a “spherical” image.
- The process of combining the individual images together is called “stitching”. This is sometimes done in the camera.
- These are not and probably will never become consumer priced.
- Number of suppliers reducing as dual sensor solutions become more mature.
- [https://blog.visualpathy.com/](https://blog.visualpathy.com/) for some interesting commentary
Spherical Cameras – Dual Sensor

- 2nd year for the big companies showing their products.
- Some higher quality camera can do in-camera stitching.
- Spatial audio evolving
- Critical for UGC VR material.
Spherical Phone Cameras

- Phone Add-on
- Simple but lower video quality
- Primarily used to generate content for social media sharing, Instagram, Facebook, etc.
- Category will eventually go away when phone use both front and rear cameras for spherical capture.
Single Sensor Sports Cam

- Has quickly become mature!
- 4K video common from all major products.
- Less copycat companies this year.
- New evolving features like video tagging, in-camera editing and object recognition.
Drones

- Image capture is the #1 function for consumer drones.
- 2nd year of dedicated hall for drone products.
- Market continues to be dominated by DJI.
- Collision avoidance being incorporated as implementation cost becomes reasonable.
- “Follow Me” to become possible in next 1-2 years. Requires massive computer processing.
- Some components being leverages from auto industry(LiDAR, global shutter, etc.).
Underwater Cameras

• Huh?????
• Cool product, not sure if consumer?
• Tethered under-water devices.
• Discover your inner “Jacques Cousteau”.
• May serve well a market not understood in California.
Enablers - Sensors

- 3D stereoscopic depth sensing.
- Silicon/MEMS LiDAR.
- Silicon Gyros & Accelerometers.
- Global shutter CMOS image sensors.
Enablers – VR Display

- LCD suppliers introducing new displays for near field use.
- Opto sensors for pupil tracking
- Expect to see new products from precision suppliers like muRata, Alps, TDK, Bosch, Samsung, etc.
Enablers – Connectivity

• Industry standards for video source to goggles interface, IEEE, VESA, etc.
• Market adoption of USB-C and USB-C DP mode.
• Market still needs a standardized wireless asymmetrical rate pixel transfer standard to untether goggles.
Bill’s Best of Show

Changhong
Material Sensing Smartphone
Power By scio™, ANALOG DEVICES

Infra-red spectroscopy
<EOM>

“ETX”

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TNX