OPTOFIDELITY™ BUDDY-3

Performance tester with 3 degrees of freedom for any head mounted display

OptoFidelity™ BUDDY-3 is a comprehensive solution for Virtual, Augmented and Mixed Reality (VR, AR, MR) Head Mounted Display (HMD) performance testing and calibration in both R&D and in Manufacturing lines.

With its integrated vision module and 3 degrees of freedom, you are able to ensure the best HMD performance including Motion to Photon (M2P) jerkiness, spatial jitter and pose drifting between real world and virtual world.

The system is based on non-intrusive measurement comparing the changes in the virtual world pose to the robotics pose. Measurement performance comes from OptoFidelity's proprietary vision module and robotics platform, which enables unbeatable repeatability, time-synchronization, and position based triggering.

TEST CASES

**Display temporal characteristics:**
- Display pixel persistence
- Display refresh rate

**Motion tracking accuracy:**
- Spatial jitter
- Drifting
- Prediction overshoot/undershoot

**Motion-to-Photon (M2P) latencies:**
- M2P latency w/o motion prediction
- M2P latency w/ motion prediction: predictable movements
- M2P latency w/ motion prediction: unpredictable movements

**Option 1: Additional stand-alone equipment or integrated into BUDDY-3**
- Motion blur: SSIM quality index
- FPS Jerkiness during movement: average frame rate, dropped frames
- FPS Jitter during movement: std deviation of frame rate
- See through latency: Camera viewfinder latency

**Option 2: Mechanical BUDDY-3 adaptation to test a handheld controller**
- Controller Motion-to-Photon latencies

TECHNICAL SPECIFICATION

**INTERFACES**
- 2x USB B female reserved for measurement instruments
- 1x RJ45 female reserved for robot control
- 1x USB B female free for headset connection
- 1x M12 8-pin female safety input for external sensor (e.g. light curtain)
- Operating voltage: 110-240 VAC
- Other features: E-Stop, power outlet & button

**HMD INTERFACES**
- Toolless mounting for any HMD (AR/VR/MR).
- USB2 link available for HMD connection, max 480 Mbit/s.

**VISION MODULE (the eye)**
- Optics: 40º Field of view with Autofocus
- Imaging sensor: 240x240 pixels
- Motion to photon analysis up to 120 Hz
- Tristimulus sensor: Point type, CIE1931, 100 kHz
- Selectable color channel triggering up to 540 Hz
- Image processing and acquisition: onboard STM32F4 microcontroller

**ROBOTICS SPECIFICATION**
- Gimbal Reach, Max Speed and Acceleration:
  - Roll: 180º, 600º/s, 2000º/s²
  - Pitch: 180º, 430º/s, 840º/s²
  - Yaw: unlimited, 600º/s, 3000º/s²
- Repeatability per axis: 36 arc seconds/0.1º
- Accuracy: absolute position calibration per request

**ROBOT CELL**
- Form factor: Table top fixture
- Test Cell dimensions (W/H/L): 500 / 670 / 500 mm
- Weight: 50 kg
- Option: safety enclosure

**CONTROL AND REPORTING**
- Graphical user interface for robot movement control and running scripts.
- Python based movement API for automation.
- Access to timestamped robot location data.
- Access to timestamped processed vision analysis data, including HMD position.
- System-wide synchronization accuracy: 100 µs covering all sensors
- Visualization reports, data for creating custom reports.
- Windows or Linux control PC

**VITAL AND REPORTING**
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**HMD TEST CONTENT**
- Test content applications: Unity/Steam, Android, iOS applications for Absolute tracking markers.
- Extensions (customized): optical flow pattern, QR-codes, colors, synchronized audio etc.
- Options to create own test content or request this from OptoFidelity
First Line Support
- First contact point
- Available onsite, 24/7
- Handles around 95% of the cases

Second Line Support
- Debugging capabilities
- Available onsite or on call
- Handles cases outside the scope of 1st line support

OPTOFIDELITY IN A NUTSHELL
- Established in 2005 at Tampere, Finland
- 170+ true tech geeks worldwide
- Offices in 3 continents
- 5000+ delivered test systems
- Collaborated with 8/10 largest mobile phone companies
- Diverse expertise from software to hardware

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