Working in 3D-Stereo – Viewing-only was yesterday!

Stefan Oeldenberger – Dipl. Geol.
Full-service solution provider …

for professional 4K, 3D and VR hardware
As a specialist hardware manufacturer, neutral and perfectly networked to all major geospatial software vendors – we enhance professional user experience!

Focused to provide best hardware value and performance, matching required software application resources to user and project requirements;

Passionate about stereoscopic visualization and data interaction, development partner for many software companies;

We are driving development: Bi-directional, active collaboration with software manufacturers, connecting hardware specifications to new geospatial application capabilities.
Stereo Implementation & Tools
Stereo Navigation – ‘vertical’ 3D controller

For GIS and Photogrammetry data capture
Stereo Visualization – how is it done?

✔ Only needs a 2nd camera view-port, placed at eye-distance with distance-depending parallax adaption;

✔ Simple stereo implementation – full resolution ‘side-by-side’ output from any graphics card – produces a full-screen left image and right image on two screens
  ➢ Advantage – works with any graphics, even on-board CPU
  ➢ Disadvantage – only full-screen stereo, no menus

✔ ‘Quad-buffer’ implementation requires OpenGL, DirectX or Vulkan
  ➢ Advantage: normal Windows environment with application menus, multiple monoscopic and stereoscopic windows
  ➢ Disadvantage: needs ‘professional’ graphic cards
**Stereo Navigation** – what is required? Any mouse!

- **Simple software implementation:** monoscopic cursor
  - Advantage: no additional effort
  - Disadvantage: cursor floats in front of the stereo visualization, not a productive way to easily edit/snap to objects, complicates also navigation in stereo

- **Professional software implementation:** stereoscopic cursor
  - Advantage: productive, intuitive working in 3D-stereo, easy editing of objects, intuitive navigation, automatic depth adaptation possible (*snapping*)
  - Disadvantage: additional implementation effort

- **CAD Assistant** – a demonstrator for a ‘perfect’ user experience – intuitive, easy-to use stereo cursor implementation, even with a normal mouse; Freeware! [Download Link]
Digital Photogrammetry – 16 years of passive displays... and counting

PLANAR SD monitors and the Schneider Digital 3D PluraView use the ‘passive Stereo’ principle with dual screens for full stereo resolution and passive (no batteries), cross-polarized glasses:

- very light-weight, comfortable glasses, bright image - daylight compatible!

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Digital Stereoscopy – more visualization options

Hardware Functionality – visualization flexibility

✅ Autostereoscopic monitors – single screen, fixed position(s)

✅ Large-format Stereo Display Systems / with and without VR interaction, e.g. Schneider Digital 'smartVR Wall'
  - Front- or back-projection, stereo with 120Hz shutter glasses

✅ Head-Mounted Displays (HMD)
  - **VR**: example - Oculus Quest 2, also for photogrammetry, 3D city models – a mobile solution!
  - **AR**: example Microsoft HoloLens 2 for engineering, simulation, Digital Twins, etc.

- Immersive 'cave' projections
- LED Tile systems
### 3D PluraView — compatible geospatial stereo-software

**Monthly updated list for stereoscopic software & vendors, current PDF on our PluraView website!**

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<tr>
<th>Software</th>
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How about your software application(s)?
2020’s Geospatial Data Acquisition & Processing
Hybrid Sensors – hybrid workflows, complimentary datasets

✔ Joint acquisition and processing of LiDAR and high-resolution imagery
  ➢ Airborne data from integrated sensors (Leica CityMapper-2)
  ➢ Airborne data from separate sensors combinations: mostly medium-format, multiple camera heads with Riegl or Teledyne Optech airborne LiDAR instruments, multi-hole configurations
  ➢ Trends: UAS data acquisition & large-area scanning, Leica SPL100

✔ Integration of airborne and terrestrial sensor data
  ➢ Addressing resolution, geometry shifts sensor and acquisition date differences
  ➢ CycloMedia and BlueSky cooperation; **Software development by Trimble, Hexagon, Vexcel?**
Trend: 'Multiple, Open, Online Data Sources’ (MOODS)

- Democratization of data acquisition, smart combination of diverse data sources:
  - Smartphone – tiny 200MPx sensors and solid-state LiDAR integration;
  - Geospatial industry adapting to provide professionally-acquired reference data as integration source and framework;
  - Multi-scale geospatial data availability from open-online satellite sources (Landsat, Sentinel); commercial, subscription-based sources (Planet, Maxar);
  - From wide-area aerial imaging (Vexcel Condor4.1, Leica Content Mapper) as national reference, to centimeter-scale 3D City models - all accessible online;
  - The value of geospatial data is based on dissemination – its’ use and –

  USEFULNESS!
MOODS – Extensive processing demands

☑ Challenge: real-time processing, products on demand

☑ Maximize the ‘usefulness’ of the available data:
  ➢ Multi-scale approach, switching sources, serving platforms and views, (public) viewers and user groups;
  ➢ Multi-temporal data availability – Google Earth ‘slider’?
  ➢ Thematic data selection – a dialogue with ‘Alexa’?
  ➢ ‘The cloud is not the only answer’
    ➢ Control?
    ➢ Intellectual property rights?
    ➢ Processing, accessibility and storage cost?
    ➢ Sustainability?
  ➢ Also a hybrid answer for a hybrid world?!
Geospatial Data – exponential growth of computing requirements

✔️ Processing equipment by specialized hardware providers – Schneider Digital

✔️ Project example: Osprey4.1 flight, AOI 4700 sq.km, 10cm resolution

- Approx. 60,000 nadir images, 4x60,000 oblique images
- Each raw nadir+oblique dataset at Level-0 amounts to 1.3GB on FDU
- Nadir RGB-I (288MPx) at 14bit, uncompressed at 2.3GB / 140TB for AOI
- Multiple products (DTM/DSM, ortho, 3D City model – 1 PetaByte storage

- UltraMap processing solution by Schneider Digital: distributed processing with high-speed fiber optics network, filesver and four (4) AMD Threadripper 32-core workstations for 128-core UltraMap5 license

Control Station

32-core processing nodes

Fiberoptics, high-speed LAN
Thank you for your attention!
More information online:

www.schneider-digital.com

www.pluraview.com