VR Researches in KRISS

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Dept. of Medical Physics
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Korea Research Institute of Standards and Science (KRISS)
Lawnmower Man
Jeff Fahey
1992
VR small conference 2018
Venue: KRISS
Date: Jul 25, 2018
Peers brosnan
Example: Diagnosis of asthma

<observation classCode="OBS" moodCode="EVN">
<templateId root="2.16.840.1.113883.10.20.22.4.4"/>
<!-- Problem Observation template -->
{id root="d11275e7-67ae-11db-bd13-0800200c9a66"/>
<code code="409586006"
  codeSystem="2.16.840.1.113883.6.96"
  displayName="Complaint"/>
<statusCode code="completed"/>
<effectiveTime>
  <low value="1950"/>
</effectiveTime>
<effectiveTime>
</effectiveTime>
<value xsi:type="CD" code="195967001"
  codeSystem="2.16.840.1.113883.6.96"
  displayName="Asthma"/>
...

Code is the question: “what is the complaint?”
Value is the answer: “Asthma”

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SC24 WG9 & Web3D Meetings

Meeting Date: January 20-25, 2019, Seoul, Korea
Meeting Place: Grand Ambassador Seoul Associated with Pullman, Seoul, Korea

Hosts: KATS (Korean Agency for Technology and Standards) and RRA (National Radio Research Agency)

Organizer: KSA (Korean Standards Association)

To be held in parallel with Web3D teleconference / ISO ZOOM meeting
January 21-22 (Web3D meetings) at 9:00-18:00 KST (Web3D teleconference)
January 23-24 (SC24 WG9 meetings) at 9:00-18:00 KST (ISO ZOOM meeting, to be arranged by Gerry)
January 25 (Web3D meetings) at 10:00-12:00 KST (Web3D teleconference)
VR Metrology and Integration (Chair: Myeong Won Lee, Suwon U.)
16:00-16:30  VR studies at Korea Research Institute of Standards and Science, Hyun Kyoong Lim (KRISS)
16:30-17:00  ISO/IEC JTC 1 VR AR for education, Myeong Won Lee (Suwon U.)

VR studies at Korea Research Institute of Standards and Science,
I have been working at ISO/TC 173 WG 11.
Four assistive devices

From China, Japan, and Korea
Northern East Forum as a Chair
(2010~2014)
ISO TC 173 WG 11, Since 2014
ISO/TC 173: Assistive products

WG 11: Assistive products for tissue integrity

WG 11 chair person: Mr. Ray Hodgkinson (UK)
Ms. Olsen Greta (DK)
Vulnerable areas to check for:

Stage 1
- Epidermis
- Dermis
- Subcutaneous fat
- Soft tissue
- Bone

Stage 2
- Epidermis
- Dermis
- Subcutaneous fat
- Soft tissue
- Bone

Stage 3
- Epidermis
- Dermis
- Subcutaneous fat
- Soft tissue
- Bone

If poor standards of care in a Care Home has caused a loved one to suffer a bed sore you could be entitled to claim compensation.
Soft tissues at the Support Surfaces

- **F perpendicular (Normal)**
- **Axial Strain**
- **Shear Strain**
- **F parallel (shear)**
People are trying to make a magic mattress
They even consider a micro climate

One more important thing than A Magic Mattress ??
Small wish
for this group
Please make a document for a general solution
NOT for a particular solution.

Eventually, it will take more time if you see a particular one.
Introduction to KRISS
Location: Daejeon
Staff: 750
Budget: $140 Million
Research Field: Physics, Biology, Chemistry, Medical field, etc
Key comparison
Degrees of equivalence $D_i$ and expanded uncertainty $U_i$ (at a 95% level of confidence) for nominal value 10 kg

그림 3. Key comparison 예 (10 kg 분동)
How do VR research at the national metrology institute?
Hard Metrology

vs.

Soft Metrology
Hard Metrology

Soft Metrology
Hard Metrology

Soft Metrology

Wong-Baker FACES™ Pain Rating Scale

0
No Hurt

2
Hurts Little Bit

4
Hurts Little More

6
Hurts Even More

8
Hurts Whole Lot

10
Hurts Worst
Background, after 2020

- Medication strategy
- Treatment plan
- Drug effect
• Patients
• Seniors
• Young
• Safety & reliability
• H/W features
• Contents features
• Evaluation criteria
• Guidelines for contents
  - Speed
  - Resolution
  - Lenz features
Measurement devices
## H/W Lenz features

<table>
<thead>
<tr>
<th></th>
<th>RED</th>
<th>NOON</th>
<th>Gear VR</th>
<th>Google Cardboard</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Display</td>
<td>Result</td>
<td>stdv</td>
<td>Result</td>
</tr>
<tr>
<td></td>
<td>Luminance</td>
<td>90.36</td>
<td>0.395 (0.87%)</td>
<td>85.8061</td>
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<tr>
<td></td>
<td></td>
<td>83.7595</td>
<td>0.2399 (0.57%)</td>
<td>83.9471</td>
</tr>
<tr>
<td>BLUE</td>
<td>Display</td>
<td>Result</td>
<td>stdv</td>
<td>Result</td>
</tr>
<tr>
<td></td>
<td>Luminance</td>
<td>29.5241</td>
<td>0.0954 (0.65%)</td>
<td>27.6099</td>
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<tr>
<td></td>
<td></td>
<td>26.8199</td>
<td>0.1752 (1.3%)</td>
<td>28.0572</td>
</tr>
<tr>
<td>GREEN</td>
<td>Display</td>
<td>Result</td>
<td>stdv</td>
<td>Result</td>
</tr>
<tr>
<td></td>
<td>Luminance</td>
<td>317.8331</td>
<td>0.728 (0.45%)</td>
<td>275.0849</td>
</tr>
<tr>
<td></td>
<td></td>
<td>292.6972</td>
<td>0.66 (0.45%)</td>
<td>285.9852</td>
</tr>
</tbody>
</table>
### Focal length and Chromatic aberration

<table>
<thead>
<tr>
<th>Focal length</th>
<th>Google cardboard lens</th>
<th>Samsung Gear VR lens</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Effective Focal Length (EFL)</td>
<td>Geen (546 nm)</td>
</tr>
<tr>
<td></td>
<td>43.6 mm</td>
<td>43.9 mm</td>
</tr>
<tr>
<td></td>
<td>40.2 mm</td>
<td>40.35 mm</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Focal length</th>
<th>Blue (486 nm)</th>
<th>Green (550 nm)</th>
<th>Red (640 nm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Google cardboard lens</td>
<td>43.19 mm</td>
<td>43.60 mm</td>
<td>44.06 mm</td>
</tr>
<tr>
<td>Samsung Gear VR lens</td>
<td>39.86 mm</td>
<td>40.2 mm</td>
<td>40.56 mm</td>
</tr>
</tbody>
</table>
Resolution

Where MTF: Modulation Transfer Function
• Measurement Devices for Optical property: Luminance & Chromaticity
• UA-10 (TOPCON)
• 5 DoF manual stage
• Dark room
• Basic testing has done for three HMD
  ❖ Lens → Luminance & Chromaticity
• VR single lens was evaluated using spherical system, focus meter, and MTF meter.
• New measurement systems were needed for the wide viewing angle & exit pupil area.
• Two devices were evaluated and found similar values.
• IEC TC110 WG12 Eyewear display
Frontal cortex

Visual c.
Attraction

Attention

Sustained Attention

Attention Engagement

Engrossment

Flow
• Test protocol: Adventure game
• Immersion process measure using EEG
• Breathe, heart rate, skin temp, etc.
• Subject grouping:
  Sensitivity to reward vs. punishment
Thank you
감사합니다!
Kamsa-hap-nida

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