Trend and Prospect on 3D Industry and R&D

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I. Prospect on 3D Industry and R&D

II. 3D Business Trend
Prospect on 3D Industry and R&D

I -1  Prospect on 3D Market
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I-1  Prospect on 3D market

3D Display, Expected to increase fast up to 22 billion dollars in 2018

3D Display, expected to increase up to 5.1% in 2015 in display market

3D TV, expected to increase 31 million units in 2012

Display Search

Prospect on 3D Industry and R&D

Displaybank

Insight Media
### Growth of 3D Market

#### 3D TV/Monitor/Notebook
- 3D TV: 6.8Mil in 2009 → 31.2Mil in 2012
- 3D Monitor: 40K in 2009 → 10Mil in 2018
- 3D Notebook: 66K in 2009 → 17.7Mil in 2018

#### 3D Movie
- 3D Screen: 5K in 2009 → 15K in 2013
  (Domestic 1.2K in 2009 → 4.8K in 2010)
- Opening around 20 Movies of 3D

#### 3D Mobile
- 71Mil in 2018: Available of 3D display application in Mobile.

#### 3D Glasses
- 3D Glasses: Increase of 3D glasses’ needs due to restricting of tech for non-glasses
I-3  3D Applicable Fields

**Broadcasting, Advertisement**
- 3D terrestrial broadcasting service
- 3D commodity advertisement
- 3D IP Broadcast, 3D DMB
- 3D Web site

**Game, Culture**
- 3D game, DVD title
- 3D movie
- 3D display communication
- 3D animation

**Aerospace, Military**
- 3D simulation
- 3D remote sensing
- Image mimic military training
- Satellite orbit adjustment

**Industry machinery and tools**
- 3D CAD, architecture
- 3D image urban design
- 3D interior design
- Industrial camera equipment

**Medical care, education**
- 3D tomography, simulator
- 3D telemicine
- Audio-visual education
- Science class

**Home display**
- Multi-media display
- Home entertainment
- Videophone
- Imaginary shopping
I-4 3D Industrial Classification

Prospect on 3D Industry and R&D

3D Display Business
3D Equipment Business
3D Contents Business
Prospect on 3D Industry and R&D

I-5 3D Technical Factor Flow

Contents: Stereo Acquisition
- Capture 3D by Rig camera system
- CG Stereo Render
- Live & CGI
- 3D Converting

Production: L/R 3D Edition
- Emulation
- 3D Image Processing
- 3D Surveillance
- Storage
- Compensator
- 3D Calibration

Distribution Format: Encoding
- MPEG2, AVC/MVC implementations
- Bandwidth optimization
- 3D display Format
- ISO/ITU/IEC/JST/MPEG

Deployment: Media Service
- BROADCAST
  - Terrestrial Satellite
  - Cable
  - DMB
  - IPTV
- PC & AV & Mobile
  - Download
  - BLU-RAY
  - DVD

Decoding: Receiver Equipment
- SET TOP BOX
- PC
- BLU-RAY
- MOBILE

Visualization: 3D-Ready Displays
- Frame Sequential
- Line Interleaved
- Checker Board
- Dual Input Projector(s)
- Anaglyph

I-6 3D Market Revitalization

Completion of 3D Hardware
• Complete of 3D Tech and Commercialization
• Available various size of hardware
• Starting the competition from South Africa World Cup Season in 2010

Increase of 3D consumer interests
• Increase of 3D response thru the development of quality and movie tech
• Easy pay of 3D contents premium
• Interests in various game, movie, sports, documentary

Increase of 3D contents application
• Consider the Profit of 3D contents (All right reserved, Premium price etc)
• 24H 3D broadcasting in Korean Sky life
• Premier league football match thru 3D in England SKY Broadcasting
• USA ESPN: Broadcasting in 2010 World Cup by 3D

Increase of 3D contents production
H/W company co-operate with contents
### I-7 3D methods comparison

<table>
<thead>
<tr>
<th>3D METHOD</th>
<th>FEATURES</th>
<th>COMPANY</th>
</tr>
</thead>
</table>
| **Polarized Glasses Type** | • Separating Left and Right Eye Views is implemented by using 3D glasses and Polarized film on the panel  
• Excellent quality for viewing angle (right/left-Free, up/down 20°)  
• Reduction of horizontal resolution (1/2) because of line by line display format  
• Excellent quality for Stereo Cross-talk program  
• The cost of the polarizing system is higher  
• It's possible for many people to watch 3D Broadcasting in popular place. | • Hyundai IT  
• Zalman  
• JVC  
• LGE |
| **Shutter Glasses Type**   | • When the L/R views are alternated on the display, it's shuttering glasses by synchronized signal to reach L/R views on the L/R eye accurately.  
• Free viewing angle in the display but synchronization requirement  
• Big decreasing brightness and inconvenience as wearing shutter glasses  
• Full resolution expression due to frame by frame display format  
• Weakness for Cross-talk issue according as LCD response time  
• Expensive electronic shutter glasses which must be recharged  
• Advantage for risk taking 3D display, almost same as 2D | • Samsung  
• Sony  
• Panasonic  
• LGE |
| **Lenticular Lens Type**   | • Using refraction of light through lenticular lens  
• Reduction of horizontal resolution (1/2)  
• Difficulty of large display/ High production cost | • LGE  
• Samsung  
• Alioscopy |
| **Parallax Barrier Type**  | • Separation of right and left image by horizontal line barrier  
• For the small size display only  
• Reduction of horizontal resolution (1/2)  
• High contents production cost | • Samsung Cellular phone |
**Prospect on 3D Industry and R&D**

I-8 Comfortable polarizing 3D method

**POLARIZED FILM 3D TYPE**

- Clean 3D realization without any wave patterns and overlapping images
- Polarization of the best high-definition 3D stereoscopic images delivered
- 3D realization without flickering and dizziness
- The sleek and lightweight, easy adoption of polarized glasses

**Shooting**

- Shooting the multi focusing ①,② images with 3D camera

**Broadcast**

- Transmitting each ①,② images to the display
- Broadcasting the ①,② images separated through line by line polarized film
- Watching each ①,② images through the polarized glasses recognizing right and left separately
I-9  Real time 3D conversion technique

3D CONVERSION Tech

- Converting every 2D images to 3D images by using HYUNDAI IT conversion tech
- Natural 3D effect applied by Ultra Smoothing tech
- True to nature 3D realization by using Depth Mapping tech
- Easy 3D realization by inputting various sources

2D ➔ 3D Conversion Tech ➔ 3D

① filter 1: Recognizing the objects
② filter 2: Arranging location of the objects
③ Depth Map: Creating 3D effect

Real time broadcasting, 2D contents, Animation, Every games, Input of DVD source
Ⅱ 3D Business Trend

Ⅱ-1 3D Broadcasting Business Trend

Ⅱ-2 Korean/Foreign 3D Contents Business Trend

Ⅱ-3 Korean/Foreign 3D Display Business Trend
3D Business Trend

3D Broadcasting Trend

3D Broadcasting Roadmap

Service & Technology Trend

- Watching Type
- Selecting Info. Type
- Personalizing Info. Type
- Creating Info. Type

Year 2004
- Color TV
- DTV
- CATV
- B&W TV
- Internet Audio

Year 2012
- UDTV
- 3DTV (Stereoscopic)
- HDTV
- DMB Broadcasting
- Interactive Data Broadcasting
- Intelligent Broadcasting
- Realistic Broadcasting

TV Sound

HD TV

CATV

B&W TV

Color TV

DTV

HDTV

UDTV

3D DMB Broadcasting

Personalized DMB Broadcasting

IPTV Broadcasting

DMB Broadcasting

DAB

Internet Audio

HYUNDAI
### 3D Business Trend

#### 3D Factor Technology Road Map

<table>
<thead>
<tr>
<th></th>
<th>2010 ~ 2012</th>
<th>2013 ~ 2015</th>
<th>2016 ~ 2018</th>
</tr>
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<tbody>
<tr>
<td><strong>Transmission</strong></td>
<td></td>
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<tr>
<td>SoC</td>
<td></td>
<td></td>
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<tr>
<td>MPEG-2 / H.264</td>
<td></td>
<td>H.264 / SVC / HVC</td>
<td>SVC, Future Codec</td>
</tr>
<tr>
<td>High compressed Encoder</td>
<td></td>
<td>Scalable Video Encoder</td>
<td></td>
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<tr>
<td>Hardwired SoC Design</td>
<td></td>
<td>SoC Optimization</td>
<td>Convergence SoC Design</td>
</tr>
<tr>
<td><strong>3D Video Creation &amp; Processing</strong></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>R&amp;D Tech</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>2D to 3D RT Conversion</td>
<td>3DFull HD Global standardization</td>
<td>3D UHD Global standardization</td>
<td></td>
</tr>
<tr>
<td>High Quality 2D/3D RT Conversion</td>
<td></td>
<td>Interactive 3D GUI Tech.</td>
<td>Multi View &amp; Auto stereoscopic Tech</td>
</tr>
<tr>
<td>High Quality 3D Image Tech.</td>
<td></td>
<td>3D Depth Rendering Tech.</td>
<td>3D Emotional Tech.</td>
</tr>
<tr>
<td><strong>Performance</strong></td>
<td>1,280 x 720 / 1,920 x 1,080 60 fps</td>
<td>1,920 x 1,080 / 3,840 x 2,160 60 / 120 fps</td>
<td>3,840 x 2,160 / 7,680 x 4,320 120 fps</td>
</tr>
<tr>
<td>HD/Full HD 3D Signal Processing</td>
<td></td>
<td>Full HD/UHD 3D Signal Processing</td>
<td>4K/8K 3D Signal Processing</td>
</tr>
<tr>
<td>Full HD 3DTV</td>
<td></td>
<td>UHD 3DTV</td>
<td>8K UHD TV / 4DTV</td>
</tr>
<tr>
<td><strong>Network</strong></td>
<td>3D IPTV</td>
<td>Home Network 3DTV</td>
<td>Realistic Media TV</td>
</tr>
<tr>
<td></td>
<td>Giga IP Processing</td>
<td>Interactive &amp; Individual Broadcasting</td>
<td>Intelligence Broadcasting</td>
</tr>
<tr>
<td></td>
<td>High-speed Data transmission</td>
<td>Wireless Data Transmission</td>
<td>Realistic Technology Platform</td>
</tr>
</tbody>
</table>
3D Business Trend

II-1 3D Broadcasting Business Trend

The World 3D Broadcasting Status

- SkyLife, Broadcasting 3D contents from this year (24hrs)
- Starts 3D DMB (Experimental broadcast) from this OCT.

- ESPN, Broadcasting South Africa World Cup in 3D
- Discovery, Making every programs in 3D from 2011

- 3D Experimental broadcast ready & completed
- Preparing for IPTV, Cable broadcasting

- Broadcasting 3D broadcast in real time from 2008 (everyday 1hr)
The world’s first 3D broadcasting

- Retention of the experience in the world’s first 3D broadcasting with Japanese BS11 broadcasting station
- The world’s first commercialization of the LCD TV receiving real time 3D broadcast (2008.04)
- In process of collaborating with the companies related to 3D broadcasting in every country as a leader of 3D broadcast tech standardization

- The world’s first 3D broadcasting (Japan, BS11 on the air)
  - December 1, 2007 ~: ‘3D Revolution’ Test broadcast
  - March 31, 2008 ~: Regular broadcasting (1 hour or more / a day)
Ⅱ-1 3D Broadcasting Business Trend

Announcement  Opening 3D TV Era in Korea

- Nation-Leading Biz.
- Next Generation 3D Broadcasting
- Economic effect
- Display Tech.
### 3D Broadcasting Promotion Comprehensive Plans in Korea

<table>
<thead>
<tr>
<th>The relevant authorities</th>
<th>Ministry of Knowledge Economy</th>
<th>KOREA Communications Commission</th>
<th>Ministry of Culture, Sports and Tourism</th>
</tr>
</thead>
<tbody>
<tr>
<td>Invest</td>
<td>10 billion won</td>
<td>5 billion won</td>
<td>20 billion won</td>
</tr>
<tr>
<td>Biz. Title</td>
<td>3D industrial convergence development Strategy</td>
<td>3D TV trial broadcast promotion team</td>
<td>3D production image Biz.</td>
</tr>
<tr>
<td>Biz. Content</td>
<td>Proceeding Korea-made Broadcasting</td>
<td>Starting 3D trial broadcast in October</td>
<td>3D Converting Tech.</td>
</tr>
<tr>
<td>Participating company</td>
<td>Association Of Realistic Media Industry, ETRI, Hyundai IT, CJ Powercast, etc</td>
<td>KBS, ETRI, Korea Cable television &amp; Telecommunications Association, Samsung Electronics, LGE, Hyundai IT, etc</td>
<td></td>
</tr>
</tbody>
</table>

- Prepare the foundation for standardizing technologies
- Full HD Quality & Backward Compatibility
- Dominate World 3D TV system in Advance
## Movie & 3D Contents

### Foreign
- Producing every animation in 3D from this year
- Planning to make 22 3D Movies by 2011
- Opening 3D Movie *Rapunzel* in early 2010

### Korean
- Government-run Task, Producing Project contents
- Making 5–6 3D Blockbuster movies
- Opening 3D movie from June

### 3D CINEMA (IMAX, Dreamworks, Disney, 20th FOX, Paramount, Universal Pictures)
II-2 Korean/Foreign 3D Contents Trend

3D Game

**Foreign**

- PlayStation 3 (PS3)
- XBOX
- Wii

- Available 3D game in this summer
- Demonstration the popular 3D game

**Korean**

- Production the 3D game player for boarding
- Reliance on the import of materials and contents

**EA Sports 3D Games**

**NVIDIA 3D PC Games Solution**

<Attack of Movie 3D>
### III-3 Korean/Foreign 3D Display Business Trend

#### Korean Company

- **SAMSUNG**: Proposed 3D combination solution to 3D TV with shutter glass type and 3D Blu-ray, 3D AV products (CES 2010)
- **LG**: Demonstrated the variety of Line-up for 55” 3D LED/LCD TV, 72” 3D LCD TV, etc. (CES 2010)
- **Hyundai IT**: Marketing for real-time 3D broadcasting LCD TV with polarized type in Japan (Apr. 2008), Sales the variety of 3D TV, 3D monitor
- **ZALMAN Tech**: Manufacturing/Sales for 3D monitor with polarized glass type
- **KDC IT**: Manufacturing/Sales for 3D equipments in theater, 3D terminal, etc.
- **i-Station**: Breakthrough of the 10 millions of 3D stereo glasses (Nov. 2009)
Foreign Company

- **Sony**: Demonstration of 3D LED TV and Player with shutter glass type (CES 2010)
- **Panasonic**: Demonstration of Full HD 3D LCD, PDP (CES 2010)
- **Real D**: Benefited from 3D equipments for theater
- **JVC**: Sales for the polarized 3D product (24”~56”) with brand ‘Victor’
- **Viewsonic**: Sales for the 3D monitor with shutter glass type
- **Planar**: Manufacturing/Sales for the costly 3D monitor for professionals
Partnerships status in 3D display market

Partnership with company for contents and 3D material, in an attempt to get leadership of 3D display market
## 3D Business Trend

### II-3 Korean/Foreign 3D Display Business Trend

#### Korean TV company VS Foreign TV company

<table>
<thead>
<tr>
<th><strong>Value Chain for 3D</strong></th>
<th><strong>Korean TV company</strong></th>
<th><strong>Foreign TV company</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Possession of TV Set, but excluding 3D business</td>
<td>The benefits for broadcasting equipments, movie, game, etc.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Sales point</strong></th>
<th><strong>Korean TV company</strong></th>
<th><strong>Foreign TV company</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>In short terms of technical development, available to sales LED, LCD, PDP</td>
<td>Targeting the one point for LCD or PDP</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Marketing strategy</strong></th>
<th><strong>Korean TV company</strong></th>
<th><strong>Foreign TV company</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Hardware Marketing (LED, design, etc.)</td>
<td>Partnership and investment for revitalization of 3D contents</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Main company</strong></th>
<th><strong>Korean TV company</strong></th>
<th><strong>Foreign TV company</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>SAMSUNG, LG, Hyundai IT</td>
<td>SONY, Panasonic, JVC</td>
<td></td>
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</tbody>
</table>
Thank you