2015 European Next Generation Human Machine Interface Technology Innovation Award
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Background and Company Performance

Industry Challenges

The advancement and adoption of wearable electronics is growing at a rapid pace. Wearables are being explored for use in multiple applications from fitness tracking to controlling devices. However, the act of controlling or interacting with computing devices using wearables is a challenging task. This task is done using sensors that are embedded into the wearable device and by tracking various parameters gestures and actions are analyzed and used as an input for computing. Understandably, accuracy becomes a key factor for success of such operation. The key challenges attributed with wearable human machine interface (HMI) devices include:

- **Accuracy**: Accuracy in detecting motion, action and position of the input organ, such as arm or finger, is critical in determining the final gesture. This requires fusion of data from multiple sensors that itself operate with high accuracy.

- **User Experience**: For providing input, users prefer to use natural gestures using wearables that do not affect the comfort levels. One of the major challenges faced in the wearable electronics industry is user experience. Nowadays, customers do not have tolerance for things that do not function in accordance with their expectations.

Israel-based MUV Interactive has developed a wearable HMI technology, called Active Human Sensing, that will enable users to effortlessly communicate and control digital content from any source (Windows, MAC, Android and iOS) and turn it into a multi-touch interface with 3D interactive capabilities. The Active Human Sensing technology integrates various interactive technologies and combines it with motion and position sensing to enable highly accurate HMI device.

Technology Attributes and Future Business Value

Product Impact

MUV Interactive has leveraged its HMI technology to create a wearable electronic product, ‘BIRD™.’ The device uses various sensing technologies such as capacitive sensing, force sensing, proximity sensing, micro switches, and so on. It also consists of inertial sensors and camera modules. The fusion of all these individual technologies allows BIRD™, comfortably worn on the user’s finger, to analyze a wide variety of interactivity methods such as: touch, hover, remote touch, gesture and voice commands, in 3D space. This finger-worn component communicates with a base unit - called NEST - using both wireless and optical channels. The NEST, along with the wearable unit is able to accurately locate the user’s position in a room. It also allows the device to understand the specific touch points and the types of surface that are being touched, whether it be a table, a wall, a sofa etc... With this technology, any display can be turned into a touch screen.
Moreover, BIRD™ allows to hover over surfaces that the user cannot, or doesn’t want, to touch, like TV screens or pull up screens, and enables to interact with them just as if they were touch screens. BIRD ultimately connects to the computer, tablet or smartphone as a standard Bluetooth device. Competing technologies are not capable of providing such advanced interactive solutions and focus primarily on capturing information from the motion of the wearable unit or capture motions remotely.

**Industry Impact**

MUV Interactive’s Active Human Sensing technology is expected to be used in various industry verticals as it enables individuals to turn any display into a touch screen and allows them to interact with their digital data on the surface of their choice. Enterprises are showing interest in this wearable device as it enhances workforce efficiency and team collaboration, as well as improving presentations, training, software products demonstrations and sales pitches.

With 3D motion sensing and in-room mapping, BIRD™ is a powerful device for enterprise users and consumers. This device is worn on the user’s index finger and achieves interaction with the surroundings through the company’s innovative technology, which combines multitude of different interaction techniques, such as gesture, voice, touch, mouse and remote control functionalities.

This device can be used in any environment where users need to interact with their data. Additionally, with wireless connections in the wearable device, it can enable seamless and natural control for devices around the user, such as smart home and IoT appliances.

**Visionary Innovation**

The company’s vision is to make any content or application interactive. This is made possible using either any off the shelf projector which projects visual content on whatever surface or interacting the content as being displayed on Smart TVs. With the wearable BIRD™, the user can directly interact with projected images. MUV Interactive’s Active Human Sensing innovative technology is unparalleled and it has the potential to revolutionize the way people interact with computers, tablets and smartphones and collaborate with each other.

**Scalability**

MUV Interactive’s HMI technology is highly scalable. On the one hand, it provided accurate understanding of micro actions (such as finger rub, finger tapping, touch etc). On the other hand the technology supports a number of gestures that allow hand signals to be used as commands. In the future, MUV Interactive is planning to enable the user to define new gestures, personalized to their own comfortability and requirements. The Active Human Sensing technology also enables multiple users to interact with the same images, making it a highly efficient collaborative platform. MUV Interactive provides a SDK,
allowing developers to develop new applications to utilize the new extended offerings presented through the use of BIRD™, such as the ability of multiple users to collaborate with the same content.

Application Diversity

The Active Human Sensing technology has potential applications across various industries. The technology is suited for use by both consumers as well as prosumers and business enterprises. The technology enables a more interactive platform that can be used in presentations, learning, gaming, team collaboration and design, as well as controlling smart home and IoT appliances.

At present, MUV Interactive is signed up with leading educational institutes around the world. It makes learning more interesting, highly engaging and more interactive by turning the blackboard into a touch screen, enabling students and their professors to interact with information, figures and shapes. Another target market of this technology is corporate presenters and public speakers that will use BIRD™ to engage their audiences better than ever before with an impressive interactive presentation.

Customer Acquisition

MUV Interactive is constantly gathering intelligence on industry needs and is addressing them while developing their newest technology. As part of this effort, MUV Interactive is engaged with a few beta sites both in the education field and in enterprises. The company will use the data gathered on these beta sites for further product development and to better address users’ needs and requirements. MUV Interactive’s policy is to develop a product that would provide better value to customers by providing them with new exciting ways to interact with data and information. The company has the potential to gain wider penetration prospects in different segments through its unparalleled technology platform.

Conclusion

MUV Interactive has developed a human activity sensing technology that enables it to convert any surface into an interactive 3D space. Using innovative wearable motion sensing platforms and integrating them with display technology allows the formation of the next generation of human machine interface solutions. With its strong performance capacities, MUV Interactive has earned Frost & Sullivan’s 2015 Technology Innovation Award in the Next Generation Human Machine Interface.
Significance of Technology Innovation
Ultimately, growth in any organization depends upon finding new ways to excite the market, and upon maintaining a long-term commitment to innovation. At its core, technology innovation or any other type of innovation can only be sustained with leadership in three key areas: understanding demand, nurturing the brand, and differentiating from the competition.

[Diagram with bullet points]

Understanding Technology Innovation
Technology innovation begins with a spark of creativity that is systematically pursued, developed, and commercialized. That spark can result from a successful partnership, a productive in-house innovation group, or the mind of a singular individual. Regardless of the source, the success of any new technology is ultimately determined by its innovativeness and its impact on the business as a whole.
Key Benchmarking Criteria
For the Technology Innovation Award, Frost & Sullivan analysts independently evaluated two key factors—Technology Attributes and Future Business Value—according to the criteria identified below.

Technology Attributes
- Criterion 1: Industry Impact
- Criterion 2: Product Impact
- Criterion 3: Scalability
- Criterion 4: Visionary Innovation
- Criterion 5: Application Diversity

Future Business Value
- Criterion 1: Financial Performance
- Criterion 2: Customer Acquisition
- Criterion 3: Technology Licensing
- Criterion 4: Brand Loyalty
- Criterion 5: Human Capital

Best Practice Award Analysis for MUV Interactive

Decision Support Scorecard
To support its evaluation of best practices across multiple business performance categories, Frost & Sullivan employs a customized Decision Support Scorecard. This tool allows our research and consulting teams to objectively analyze performance, according to the key benchmarking criteria listed in the previous section, and to assign ratings on that basis. The tool follows a 10-point scale that allows for nuances in performance evaluation; ratings guidelines are illustrated below.

RATINGS GUIDELINES

The Decision Support Scorecard is organized by Technology Attributes and Future Business Value (i.e., the overarching categories for all 10 benchmarking criteria; the definitions for each criterion are provided beneath the scorecard). The research team confirms the veracity of this weighted scorecard through sensitivity analysis, which confirms that small changes to the ratings for a specific criterion do not lead to a significant change in the overall relative rankings of the companies.
The results of this analysis are shown below. To remain unbiased and to protect the interests of all organizations reviewed, we have chosen to refer to the other key players as Competitor2 and Competitor3.

**DECISION SUPPORT SCORECARD FOR TECHNOLOGY INNOVATION AWARD**

<table>
<thead>
<tr>
<th>Measurement of 1–10 (1 = poor; 10 = excellent)</th>
<th>Technology Attributes</th>
<th>Future Business Value</th>
<th>Average Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Technology Innovation</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MUV Interactive</td>
<td>9</td>
<td>9</td>
<td>9.0</td>
</tr>
<tr>
<td>Competitor2</td>
<td>8</td>
<td>7</td>
<td>7.5</td>
</tr>
<tr>
<td>Competitor3</td>
<td>7</td>
<td>7</td>
<td>7.0</td>
</tr>
</tbody>
</table>

**Technology Attributes**

**Criterion 1: Industry Impact**
Requirement: Technology enables the pursuit of groundbreaking new ideas, contributing to the betterment of the entire industry

**Criterion 2: Product Impact**
Requirement: Specific technology helps enhance features and functionality of the entire product line for the company

**Criterion 3: Scalability**
Requirement: Technology is scalable, enabling new generations of products over time, with increasing levels of quality and functionality

**Criterion 4: Visionary Innovation**
Requirement: Specific new technology represents true innovation based on a deep understanding of future needs and applications

**Criterion 5: Application Diversity**
Requirement: New technology serves multiple products, multiple applications, and multiple user environments

**Future Business Value**

**Criterion 1: Financial Performance**
Requirement: High potential for strong financial performance in terms of revenues, operating margins and other relevant financial metrics

**Criterion 2: Customer Acquisition**
Requirement: Specific technology enables acquisition of new customers, even as it enhances value to current customers
**Criterion 3: Technology Licensing**
Requirement: New technology displays great potential to be licensed across many sectors and applications, thereby driving incremental revenue streams.

**Criterion 4: Brand Loyalty**
Requirement: New technology enhances the company’s brand, creating and/or nurturing brand loyalty.

**Criterion 5: Human Capital**
Requirement: Customer impact is enhanced through the leverage of specific technology, translating into positive impact on employee morale and retention.

**Decision Support Matrix**
Once all companies have been evaluated according to the Decision Support Scorecard, analysts can then position the candidates on the matrix shown below, enabling them to visualize which companies are truly breakthrough and which ones are not yet operating at best-in-class levels.

[Diagram of the Decision Support Matrix showing high and low future business value and technology attributes with companies MUV Interactive, Competitor2, and Competitor3 positioned on the matrix.]
The Intersection between 360-Degree Research and Best Practices Awards

Research Methodology

Frost & Sullivan’s 360-degree research methodology represents the analytical rigor of our research process. It offers a 360-degree-view of industry challenges, trends, and issues by integrating all 7 of Frost & Sullivan's research methodologies. Too often, companies make important growth decisions based on a narrow understanding of their environment, leading to errors of both omission and commission. Successful growth strategies are founded on a thorough understanding of market, technical, economic, financial, customer, best practices, and demographic analyses. The integration of these research disciplines into the 360-degree research methodology provides an evaluation platform for benchmarking industry players and for identifying those performing at best-in-class levels.
Best Practices Recognition: 10 Steps to Researching, Identifying, and Recognizing Best Practices

Frost & Sullivan Awards follow a 10-step process to evaluate award candidates and assess their fit with select best practice criteria. The reputation and integrity of the Awards are based on close adherence to this process.

<table>
<thead>
<tr>
<th>STEP</th>
<th>OBJECTIVE</th>
<th>KEY ACTIVITIES</th>
<th>OUTPUT</th>
</tr>
</thead>
</table>
| 1 Monitor, target, and screen | Identify award recipient candidates from around the globe | • Conduction in-depth industry research  
• Identify emerging sectors  
• Scan multiple geographies | Pipeline of candidates who potentially meet all best-practice criteria |
| 2 Perform 360-degree research | Perform comprehensive, 360-degree research on all candidates in the pipeline | • Interview thought leaders and industry practitioners  
• Assess candidates’ fit with best-practice criteria  
• Rank all candidates | Matrix positioning all candidates’ performance relative to one another |
| 3 Invite thought leadership in best practices | Perform in-depth examination of all candidates | • Confirm best-practice criteria  
• Examine eligibility of all candidates  
• Identify any information gaps | Detailed profiles of all ranked candidates |
| 4 Initiate research director review | Conduct an unbiased evaluation of all candidate profiles | • Brainstorm ranking options  
• Invite multiple perspectives on candidates’ performance  
• Update candidate profiles | Final prioritization of all eligible candidates and companion best-practice positioning paper |
| 5 Assemble panel of industry experts | Present findings to an expert panel of industry thought leaders | • Share findings  
• Strengthen cases for candidate eligibility  
• Prioritize candidates | Refined list of prioritized award candidates |
| 6 Conduct global industry review | Build consensus on award candidates’ eligibility | • Hold global team meeting to review all candidates  
• Pressure-test fit with criteria  
• Confirm inclusion of all eligible candidates | Final list of eligible award candidates, representing success stories worldwide |
| 7 Perform quality check | Develop official award consideration materials | • Perform final performance benchmarking activities  
• Write nominations  
• Perform quality review | High-quality, accurate, and creative presentation of nominees’ successes |
| 8 Reconnect with panel of industry experts | Finalize the selection of the best-practice award recipient | • Review analysis with panel  
• Build consensus  
• Select winner | Decision on which company performs best against all best-practice criteria |
| 9 Communicate recognition | Inform award recipient of award recognition | • Present award to the CEO  
• Inspire the organization for continued success  
• Celebrate the recipient’s performance | Announcement of award and plan for how recipient can use the award to enhance the brand |
| 10 Take strategic action | Upon licensing, company may share award news with stakeholders and customers | • Coordinate media outreach  
• Design a marketing plan  
• Assess award’s role in future strategic planning | Widespread awareness of recipient’s award status among investors, media personnel, and employees |
About Frost & Sullivan

Frost & Sullivan, the Growth Partnership Company, enables clients to accelerate growth and achieve best in class positions in growth, innovation and leadership. The company’s Growth Partnership Service provides the CEO and the CEO's Growth Team with disciplined research and best practice models to drive the generation, evaluation and implementation of powerful growth strategies. Frost & Sullivan leverages almost 50 years of experience in partnering with Global 1000 companies, emerging businesses and the investment community from 31 offices on six continents. To join our Growth Partnership, please visit http://www.frost.com.