Scalable Sensor Fusion Platform for Multi-Modal HMI Applications

Albert Lu
Chief Technology Officer
Interlink Electronics
Who We Are

Leading HMI/sensor fusion technology platform provider with a 32 year track record in providing global solutions

Inventor of force sensing technology and Force Sensing Resistor® (FSR®)

Innovator in printed electronics manufacturing and commercialization

HMI/sensor fusion solutions provider: design, prototyping, volume manufacturing and application integration

A global footprint leveraging key strategic design, manufacturing & market locations

Public company (Nasdaq:LINK) with Fortune 500 customer base
Growth Market Opportunities

**Interlink Electronics**

HMI/Sensor Fusion Solution Platforms

- **IoT**
  - Wearable Sensing
  - Augmented Reality

- **Medical**
  - Proximity Detection
  - Physiological Monitoring

- **Robotics**
  - Collision Avoidance
  - Dexterity Manipulation

- **Automotive**
  - Vehicle Entry
  - Driver Assistance

- **Computing**
  - Computer Interface
Markets & Applications

Automotive

Industrial/Rugged Electronics

Healthcare/Medical

Portable Electronics
Flexible/Hybrid Electronics Landscape

- **Light Guide**
- **Sensor Display**
- **Barrier Film**
- **Photovoltaic Battery Lighting**

**Features**
- Feature Resolution Dependent
- Device Lateral Resolution
- Surface Area Dependent

**Functionality**
- Passive
- Active
Flexible/Hybrid Electronics Supply Chain

1. Printable Functional Materials
2. Device Design and Engineering
3. Hybrid/Printed Electronics Manufacturing
4. System-Level Integration
Multi-Modal HMI Overview

User Needs:
- Connectivity
- Low Distraction
- Intuitive
- User Experience

HMI Solution:
Input:
- Touch
- Motion
- Audio

Output:
- Tactile
- Display
- Audio

Multi-Modal HMI System
Technology Platforms & Solutions

Technology Portfolio
- Functional Materials
- Device Platforms
- Firmware & Software
- Strategic Technology Themes

Solution Portfolio
- Signal Processing & Computation
- Visualization & User Feedback
- Multi-Parameter Sensing
- System-Level Solution
Typical Force Sensing/HMI Implementation

- Force Sensing Surface
- Force Actuator
- Haptic Actuator
- Light Guide
- Force Sensing Transducer
- Signal Processor
Sensor Fusion Platform Architecture

- Environmental Sensing Devices
- Force/Strain Sensing Devices
- Inertial Measurement Device
- Multi-Modal HMI Controller
- Multi-Modal Actuator Devices
- ARM MCU BLE / USB Interface
- Android/iOS Controller BLE / USB Interface
- Graphics User Interface
- Power Management Devices
Wearable Sensor Fusion Device

- Force Sensing Devices
- Inertial Measurement Device
- Multi-Modal HMI Controller
- ARM MCU BLE / USB Interface
- Power Management Devices
- Android/iOS Controller BLE / USB Interface
- Graphics User Interface
<table>
<thead>
<tr>
<th>Sensing Parameter</th>
<th>Sensing Device</th>
</tr>
</thead>
<tbody>
<tr>
<td>Force/Pressure Sensing</td>
<td>Flexible Printed Force Sensing Elements</td>
</tr>
<tr>
<td>Inertial Motion Sensing</td>
<td>MEMS</td>
</tr>
<tr>
<td>Acceleration</td>
<td>3-Axis Accelerometer</td>
</tr>
<tr>
<td>Angular Rotation</td>
<td>3-Axis Gyroscope</td>
</tr>
</tbody>
</table>
## Wearable Sensor Fusion Device

<table>
<thead>
<tr>
<th>Signal Processing</th>
<th>Sensing Device</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multi-Modal Parameter Processing</td>
<td>ARM MCU</td>
</tr>
<tr>
<td>Multi-Modal Data Analytics</td>
<td>Android Host System</td>
</tr>
<tr>
<td>Wireless Data Interface</td>
<td>BLE</td>
</tr>
</tbody>
</table>
Multi-Modal Data Analytics
Wearable Sensor Fusion Device

- Pressure Mapping
- Motion Animation
- Motion Sensing

System-Level Solution
Visualization & User Feedback

Walking Forward