A Behind-the-Scenes Peek at World's First Linux-Based Laptop Orchestra – The Design of L2Ork Infrastructure and Lessons Learned

Ivica Ico Bukvic
Virginia Tech
DISIS, L2Ork, ICAT, Linuxaudio.org
Department of Music - 0240
Blacksburg, VA, 24061
ico@vt.edu

l2ork.music.vt.edu
facebook.com/L2Ork
What is L2Ork?

L2Ork is part of the latest interdisciplinary initiative by the Virginia Tech Music Department’s Digital Interactive Sound & Intermedia Studio (DISIS). As an emerging contemporary intermedia ensemble with a uniquely open design, L2Ork thrives upon the quintessential form of collaboration found in the western classical orchestra and its cross-pollination with increasingly accessible human-computer interaction technologies for the purpose of exploring expressive power of gesture, communal interaction, discipline-agnostic environment, and the multidimensionality of arts.
Identity & Mission

Physical Presence and Choreography

Seamless Integration of Traditional and Contemporary

100% FOSS-Based

Ultra-Affordable Design

Affirmation as a Professional Ensemble

Fusing STEM and Arts in K-12 Education
Project History

2008  Tonmeistertagung Keynote

2009  Fundraising, Grants, Sponsors
       L2Ork founded
       Debut (TV, Radio, Internet coverage)

2010  1st Midwest Tour
       Linux Journal Front Cover
       Xcaliber Award
       2nd NC Tour

2011  1st Place International Laptop Orchestra Composition Competition
       3rd European Tour

2012  4th NE Tour
       One of the 4 Guest Laptop Orchestras on SLEO
### Project Support

<table>
<thead>
<tr>
<th>VT Stakeholders</th>
<th>Corporate Sponsors</th>
</tr>
</thead>
<tbody>
<tr>
<td>AR</td>
<td>MSI Mobile Inc.</td>
</tr>
<tr>
<td>Arts Initiative</td>
<td>Renoise Inc.</td>
</tr>
<tr>
<td>CAUS</td>
<td>Roland Inc.</td>
</tr>
<tr>
<td>CCTAD</td>
<td>Sweetwater Inc.</td>
</tr>
<tr>
<td>CHCI</td>
<td></td>
</tr>
<tr>
<td>CIDER</td>
<td></td>
</tr>
<tr>
<td>CLAHS</td>
<td></td>
</tr>
<tr>
<td>CTEG</td>
<td></td>
</tr>
<tr>
<td>DISIS</td>
<td></td>
</tr>
<tr>
<td>ICAT</td>
<td></td>
</tr>
<tr>
<td>ICTAS</td>
<td></td>
</tr>
<tr>
<td>IDDL</td>
<td></td>
</tr>
<tr>
<td>IT</td>
<td></td>
</tr>
<tr>
<td>LT</td>
<td></td>
</tr>
<tr>
<td>Music</td>
<td></td>
</tr>
<tr>
<td>OAA</td>
<td></td>
</tr>
<tr>
<td>OIA</td>
<td></td>
</tr>
<tr>
<td>SOE</td>
<td></td>
</tr>
<tr>
<td>SOPAC</td>
<td></td>
</tr>
</tbody>
</table>
K-12 Impact

2010 Partnership with the Boys & Girls Club of Southwest Virginia
Boys & Girls Club Satellite Laptop Orchestra
Co-Performing with L2Ork

2011 Co-Performing with L2Ork

2012 K-12-Friendly Tools For Composition
### Hardware

<table>
<thead>
<tr>
<th>Item</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSI U100</td>
<td>$300</td>
</tr>
<tr>
<td>Nintendo Wiimote/Nunchuk/Plus</td>
<td>$50</td>
</tr>
<tr>
<td>UA-1G Soundcard</td>
<td>$70</td>
</tr>
<tr>
<td>Cables &amp; Accessories</td>
<td>$30</td>
</tr>
<tr>
<td>Custom-Built Hemispherical Speakers</td>
<td>$250</td>
</tr>
<tr>
<td>Sub (shared)</td>
<td>$30</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$730</strong></td>
</tr>
</tbody>
</table>
Software

Ubuntu-Based (currently 10.04/linux-rt, 12.04/linux-lowlatency soon)

2009  Modified Pd-Extended + Custom Version of libCwiid
       Focus on Usability, Stability, UI development

2010  Introduced Pd-L2Ork
       Considerable Architectural Changes
       Custom Externals
       Over 200 Bug-Fixes and Improvements
           (Infinite Undo, Cord Inspector, Tooltips, Accelerated GUI)
       Portions Increasingly Adopted Upstream

2012  Custom Version of libCwiid/disis_wiimote
       First FOSS Implementation That Supports Passthrough Mode
Software
Software

Solo improv using aAaBbB
Implementation

Performance Environment

Station n

Wired LAN

Data Filtering Pd-L20rk

Status Data UDP Broadcast

Austru

Briza

Cyclone

...
Call for Composers to Contribute/Compose for the Ensemble

Devs/Contributors Needed
- Weeding Out Unnecessary Externals
- Separating Headless and GUI-Based Versions
- Getting Rid of the GUI-Engine Socket-Based Communication
- Migrating Pd-L2Ork to JUCE/Qt
- Documentation

Improving Git Framework and Data Tree Structure

Migrate to Ubuntu 12.04 + HP dm1 4142nr

More Satellite Laptop Orchestras

Renoise

More Composition, Performance, Education
Lessons Learned

Last 20% is Indeed 80% of the Work
  Usability
  Stability
  User Experience
  Transparency
  Efficiency

Project Forks
  Increase Workload
  Stimulate Pace of Development

Is Linux Ready For Primetime?
  Wrong Question
  Does It Meet Project's Specific Needs?
Acknowledgments

VT Stakeholders
Sponsors
Partners
LA* Community
A Behind-the-Scenes Peek at World's First Linux-Based Laptop Orchestra – The Design of L2Ork Infrastructure and Lessons Learned

Ivica Ico Bukvic
Virginia Tech
DISIS, L2Ork, ICAT, Linuxaudio.org
Department of Music - 0240
Blacksburg, VA, 24061
ico@vt.edu

l2ork.music.vt.edu
facebook.com/L2Ork