iLab Solutions: Hardware Interlock

May 11, 2015
Hardware Interlock Module
Hardware Interlock Module Overview

**Instrument Access Control**

- Decouples the tracking system from the local OS
- Power box controls access to equipment via secure network
  - Equipment does not have to be on the internet
- Real time tracking of usage
- Kiosk is used to log people in but it can allow one login location for multiple equipment
- Login may be iLab password or SAML/LDAP if set up
Benefits of the Access Control Module

Value to Core Staff
- Can manage who accesses the equipment (trained users only)
- View equipment usage in real time
- Maximize equipment usage
  - Ensure scheduled time on calendars is honored
  - Allow walk-ups when time is available

Value to Customer
- Logs in at kiosk to see what equipment is available
- See what equipment they are trained on and can access
- Review their scheduled sessions
- When exiting, they log out which captures their actual time and shuts down equipment.
Interlock Schematic

- Walk-in...
  - Are you trained?
  - Is anyone else scheduled?
  - Is the equipment available at this time?

- Pre-scheduled...
  - Login and activate a pre-scheduled session
  - Track actual start and end times
  - Give up remaining time for others to use

Interlock Configuration Page:

- Interlock 1
  - Status: ONLINE
  - Connected to:
    - Scope 1: ON
    - Scope 2: unavailable

- Interlock 2
  - Status: ONLINE
  - Connected to:
    - Scanner 1: ON
    - Scanner 2: available
    - Scanner 3: available
    - Scanner 4: ON

Bridge

- Interlock hardware on dedicated IP addresses that can be addressed by the bridge on a local VLAN

- Secure ssh tunnel

Scope 1 and Scope 2

Scanners

channel 1

channel 2

channel 3

channel 4
Interlock Typologies

IP based Remote Power Switch System

- One box, one IP, provides secure control of multiple instruments
- Requires dedicated static IP
- Provides secured remote power source management operation and AC current
- Turns on and off devices (computer monitors, simple devices, etc.)
Interlock Typologies

IP based, multiple channel, Solid State Interlocks

- One box, one IP, provides secure control of multiple instruments
- Both analog and digital outputs
- Geared towards complex lab/cleanroom setups, with the need to control access to instruments not necessarily connected to a computer and when turning on and off the whole instrument is not a viable option
- Allows fine-tuned controls of remote, complex instruments, including feedback loops.
- Requires dedicated static IP
- In most cases will require professional electrical installation and wiring
Interlock Screenshots
Interlock Configuration

Cores can configure interlock controlled equipment

<table>
<thead>
<tr>
<th>Type</th>
<th>Synaccess interlock</th>
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</thead>
<tbody>
<tr>
<td>IP Address</td>
<td>192.168.1.100</td>
</tr>
<tr>
<td>Port</td>
<td>4599</td>
</tr>
<tr>
<td>User_name</td>
<td>admin</td>
</tr>
<tr>
<td>Password</td>
<td>admin</td>
</tr>
</tbody>
</table>

Last checked N/A

1. High Resolution X-ray Diffractometer (PANALYTICAL X³PERT PRO) (HR X-ray)
2. Powder X-ray Diffractometer (SIEMENS D5000) (pXRD)
3. Add Equipment
4. Add Equipment
5. Add Equipment
6. Add Equipment
Core Control

Core managers can see what equipment is active via the interlock interface. Managers/staff can remotely power equipment on/off as necessary.
Kiosk Interface

Kiosk module in lab controls access to equipment. Users can view their calendar, start sessions, or schedule walk-up sessions (if allowed).
## Control Equipment Settings

### Service center settings

#### Time and duration settings

<table>
<thead>
<tr>
<th>Setting</th>
<th>Value</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum reservation time</td>
<td>0</td>
<td>MINUTES</td>
</tr>
<tr>
<td>Maximum reservation time</td>
<td>0</td>
<td>MINUTES</td>
</tr>
<tr>
<td>Time step</td>
<td>15</td>
<td>MINUTES</td>
</tr>
<tr>
<td>Time when reservation is considered abandoned</td>
<td>120</td>
<td>MINUTES</td>
</tr>
<tr>
<td>How much in advance reservation can be started</td>
<td>60</td>
<td>MINUTES</td>
</tr>
</tbody>
</table>

#### Common settings

- **Allow walk ups?**
- **Strict payment information?**

Manage settings that control how individuals should interact with resources in the core facility.
Control Equipment Settings

You can also control resource specific settings from the new dashboard, including managing trained and untrained users (as a core facility member).
Within an event, core can ask the customer to provide different pieces of information - including payment information.