CATALYST

Chemical Inventory Management for Laboratories
In labs it is difficult to keep chemical inventory organized

“Oftentimes, finished chemicals are thrown away without being removed from the inventory system. Researchers waste time looking for these chemicals because they are still listed in inventory.”

- Lab Manager, Buchwald Group
Catalyst: Product Vision

Internal Top View

- Antenna Coil
- NFC Reader
- Microcontroller
- Bluetooth
- Load Cells

Internal Side View
How Catalyst works

1. A storage area with various chemicals.
2. Containers of HCl and NaOH.
3. A computer screen displaying Mat 1 and Mat 2 with HCl and NaOH contents.
4. Chemical reactions involving HCl and NaOH.
5. A container with HCl.

2.009

SILVER
# Product Contract

<table>
<thead>
<tr>
<th>Needs</th>
<th>Attributes</th>
<th>Specs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tracks inventory without complicated procedure</td>
<td>Passive tracking</td>
<td>Does not alter user’s daily use of chemicals</td>
</tr>
<tr>
<td>Location and weight data easily accessible to user</td>
<td>Information accessibility</td>
<td>Data displayed on lab computer, tablet, etc.</td>
</tr>
<tr>
<td>Measures the weight of all chemical containers found in lab</td>
<td>Scale precision &amp; maximum</td>
<td>10 g resolution</td>
</tr>
<tr>
<td></td>
<td></td>
<td>50 kg maximum</td>
</tr>
<tr>
<td>Accurately tracks chemical location</td>
<td>Sensing range</td>
<td>Sensing range covers mat area with &lt; 1 cm extension over edges</td>
</tr>
<tr>
<td>Fits wherever chemicals are currently stored</td>
<td>Size</td>
<td>&lt; 4 ft² area</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&lt; 3 inch height from shelf surface</td>
</tr>
<tr>
<td>Recognizes chemicals quickly once they are returned to shelf</td>
<td>Speed of recognition</td>
<td>&lt; 1 s</td>
</tr>
<tr>
<td>Integrates with existing software</td>
<td>Information integration</td>
<td>Wireless communication and real time data population</td>
</tr>
</tbody>
</table>
Mockup Design

• NFC sensors
• 10 kg load cell
• Real time tracking of weight & chemical identity
Key Findings

- RFID reader capable of recognizing multiple passive tags at discrete times
- RFID & load cells can be integrated to provide real-time chemical location & quantity data
- Feasible to create well-defined RFID sensing area across entire mat
- Reasonably priced load cells can accommodate max. weight with required resolution

Demonstrated in mockup

Validated through research
Critical Risks Moving Forward

• Power access

• Tedious process of inputting chemicals