

Smart Tracking Tray System for A Smart and Sustainable Wet Lab Community

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Nan Xu Jingchen Li Yue Yu Yang Li
Advisor: Prof. Jinglei Yang
Hong Kong University of Science and Technology



Background

The laboratories and research institutes are the major place of doing cutting-edge scientific exploration. Hundreds of millions of research papers were formed from front-line labs. Behind this glorious achievement were three unsustainable facts:

1. The **reproducibility** of the experiment is low;
2. The experimental data are too costly to meet current **data analysis needs**;
3. The global experimental innovation efficiency has encountered a **bottleneck**.

Although several laboratory tools exist in the market, they bring obstacles and annoying external manual work to the users. With our RFID and multi-sensing technologies, X-Tray subversively frees the daily manual effort to track timely data. The timely data empowered by algorithms is the basement of time-sensitive chemicals management and the chemical fast transfer system, reducing waste and facilitating innovation productivity.

Proposed Solution

The system consists of four layers (Fig. 1). The hardware block is the most fundamental part of the system. It includes RFID readers and weight sensors and can be extended with other functional sensors. They can detect the chemicals' information, corresponding historical weight changes, and related user information (Fig. 2). The real-time data acquired will be sent to the central database in the software backend, for further alignment and processing.

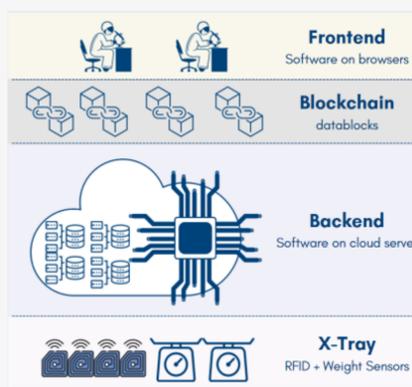


Fig. 1

A user-friendly interface will present clients with comprehensive chemical information through cross-platform software (Fig. 3). Users can search for chemical information on it while lab managers can monitor the chemical use in real-time and over history.

The demo website can be found at <http://demo.wesharetechnology.com> or the QR code below (Fig. 4).

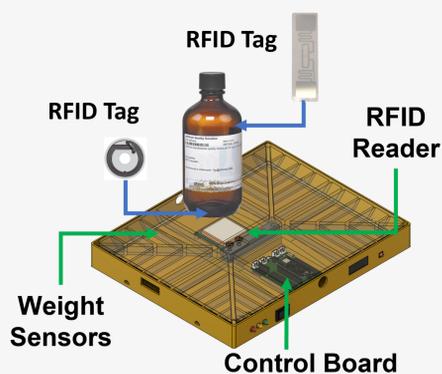


Fig. 2

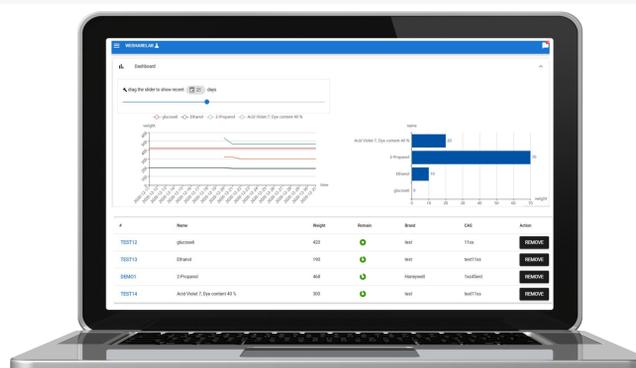
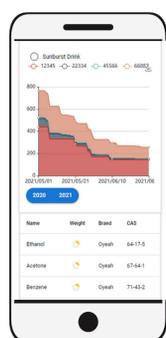


Fig. 3



Fig. 4

| Compared items | Conventional management | Management via X-Tray |
|-------------------------------------|---|--|
| Searching method | Users need to go to lab and find chemicals manually | Users can pre-check and locate chemicals before move |
| Searching time | > 20 mins | < 5 mins |
| Check of stock and remaining weight | NA | YES |
| Notification method | NA | YES |
| Cooperation | NA | YES |

Evaluation

- Compared with the conventional management methods, Users no longer need to go to the lab for the onsite check with our system deployed.
- Our system can decrease the chemical searching time from **20+ minutes to less than 5 minutes**.
- The inventory check, notification, and cooperation functions are **online-based** and **user-friendly**.

Conclusion

We proposed a Smart Tracking Tray system for chemical management. We have already received positive feedback from pilot tests in several labs at HKUST. The system benefits various lab users in their daily work and improves their working efficiency.

In the long run, we believe it will play an essential role in promoting the efficient use of lab resources and achieving the goal of sustainable labs.

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