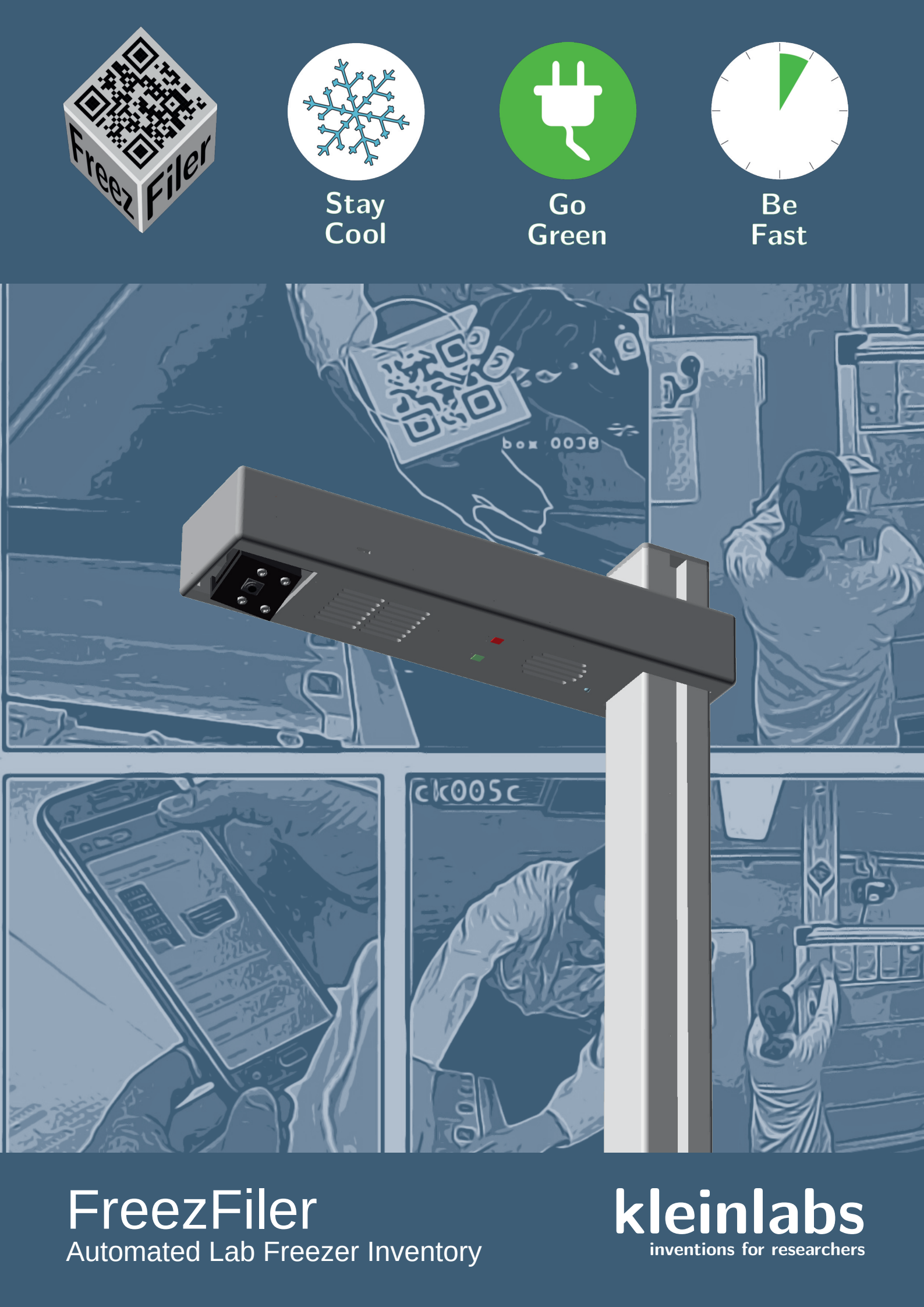

FreezFiler

Automated Lab Freezer Inventory

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inventions for researchers

A reliable and always up-to-date inventory of Ultra Low Temperature (ULT) freezers is an ambitious goal. All lab personal have to be disciplined and take time to manully update an electronic or paper-based database of box locations.
FreezFiler Automated Lab Freezer Inventory (ALFI) is a complete solution for automated lab freezer inventory. After an initial acquisition of a sample box, the system tracks automatically its location in any freezer in the lab based on visual detection of box and rack movements.

Standard sample boxes are labeled with a QR code. A camera on the top of the freezer tracks boxes and updates their location on the FreezFiler Server. The location of boxes can be found via a webapp (PC, iOS and Android) without opening the freezer door.

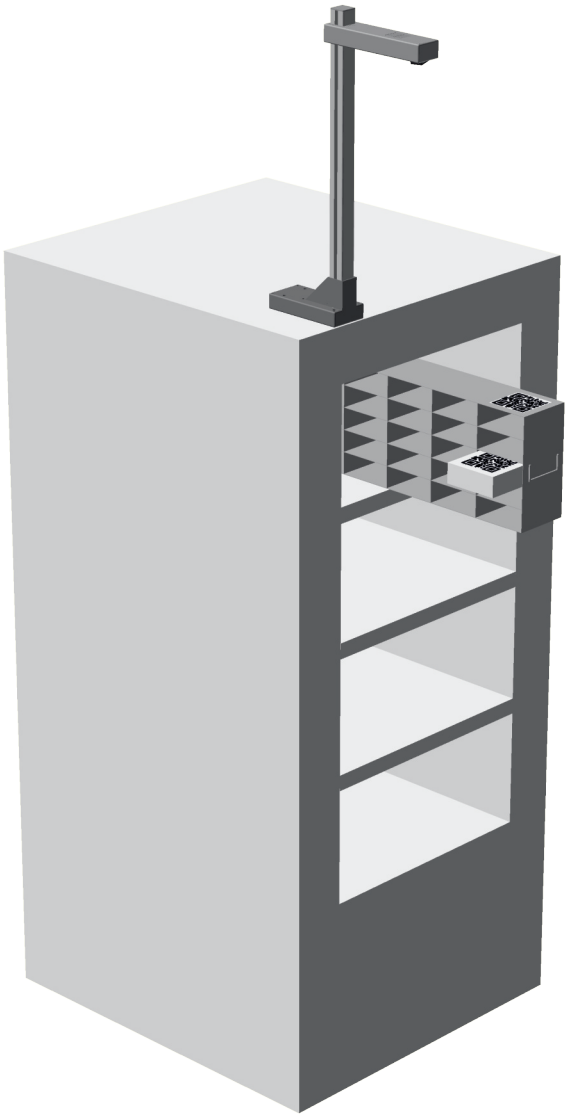
The FreezFiler solution can be installed on any upright freezer and is economic starting from the first freezer it is installed on.

Before FreezFiler

Researchers in different areas of science need to store samples in laboratory ULT freezers in temperature areas of -80°C. Those samples are usually organized in standardized boxes and standardized racks. A freezer can store between 400-700 boxes. Most lab freezer inventories need to be updated manually, which is time consuming and needs a lot of discipline. Failure to update the inventory makes the retrieval of a box difficult: The user has no choice but search with the freezer's door open for long time intervals. This puts the samples in the freezer in danger and costs a lot of energy.

With FreezFiler

The mission of FreezFiler is to simplify the life of the user by tracking the location of the sample boxes automatically.



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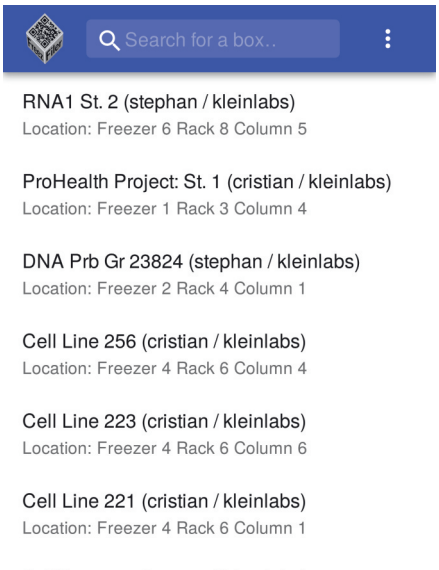
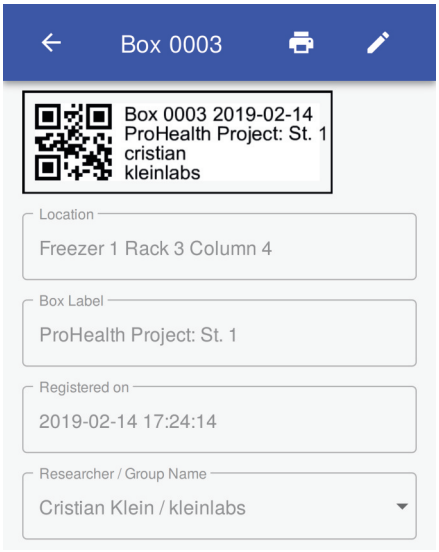
With FreezFiler, manual work is reduced to a one-time registration of a box in the database. Reoccurring, tedious and error-prone manual work – like checking in and checking out a box – is eliminated.
FreezFiler consists of:
- a QR code on top of each sample box
- a FreezFiler Eye on each freezer
- the FreezFiler Server
- Human Label Printers
- the FreezFiler Web App.

FreezFiler Eye is a camera system with a patent-pending computer vision algorithm installed on top of each freezer. It tracks



boxes, detects insertion and removal of boxes, and sends the new location of boxes to the FreezFiler Server. The success of the detection is indicated to the user via audio and visual feedback. The FreezFiler Eye only outputs the recognized actions to the server, it needs a very low bandwidth connection to the FreezFiler Server and can be connected via copper wires for alarm, often already found in labs.

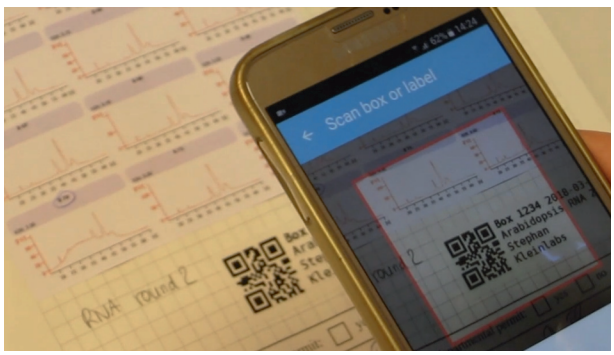
Human Label Printer produces labels with the box metadata, such as owner,



box label and registration date, as stored on the FreezFiler Server. The labels can be either sticked to the side of the box, as mandated in many laboratories, or on a paper labbook. The labels also contains a QR code, to allow quick retrieval of the box metadata using the FreezFiler App.

FreezFiler Server is a server that hosts the database and the FreezFiler App. Box data never leaves the server, hence allowing FreezFiler ALFI to be used even in environments with very strict security and compliance requirements.

FreezFiler App is the user interface to retrieve and edit box metadata, and especially the box location, as tracked by the FreezFiler Eye. The App is web based and runs on mobile terminals and desktop computers.



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Order Code

– FFE-1902: FreezFiler Eye, 1pc/freezer
– FFS-1902: FreezFiler Server 1pc/lab
– HLP: Human Label Printer
– MLP: Machine Label Printer
– ML100: Machine Label 100pc ready to use (preprinted)

Deployment Options

Server:

– Software-as-a-Service (SaaS)
– Virtual appliance (container-based)
– Stand-alone mini-server (including air-gapped deployments)

Network:

– Bandwidth requirements between FreezFiler Eye and FreezFiler Server: 1 KB/s (8 kbps) e.g. possible via 2-wire Ethernet bridge
– Ethernet or Wireless

Software Features

– Compatible with all newer browsers: Chrome, Firefox, Safari, Edge on Android, iOS and PC
– Over-the-Air (OTA) updates
– DualBoot firmware system
– WebApp or REST API for configuration and monitoring
– IPv4 configuration via DHCP or APIPA
– IPv6 configuration via SLAAC
– WiFi security: WPA / WPA2 PSK
– HTTP or HTTPS (via Let's Encrypt)
– Single sign-on via OAuth2 or SAML

Mini-Server Hardware Features

– Dimensions: 200x195x60mm³
– Weight: 2.5kg
– Power Supply: 12V DC, 5A (PSU 100V-240VAC included)
– Avg. power consumption 8W
– Network:
  Ethernet RJ45 1000BaseT
  Wi-Fi 802.11 b/g/n

About kleinlabs

kleinlabs develops solutions to help researchers in different work areas increase productivity and reduce running costs. In short, to support the focus on the research work. To reach these goals, our team combines the experience of applied researchers in different areas with state of the art IT and automation know-how. This leads to solutions which are application driven from the beginning and do not intent to force their users to do more work but to ease their daily routine.

We provide both customized development services and off-the-shelf products. This gives us the possibility to adapt our products to our customer needs, and still offer economic and scalable solutions.

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