



Providing a Mobile Interface for Manual Storage Using Mosaic's Augmented Reality (AR) Application

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v1.0

THE PROS AND CONS OF MANUAL SAMPLE STORAGE

Manual sample storage (in freezers, fridges, cryovials, ULT stores, and so on) is the backbone of most labs because it is cheap (often inherited with the lab) and because it provides a variety of different storage conditions suited to specific sample types.

However, manual sample storage presents huge challenges for sample management because traceability relies entirely on manual processes. These are prone to errors or can simply be bypassed:

- Manual stores do not have a user interface to update sample locations, so updates must be made somewhere else
- Inventory updates are not automatic, so the user has to remember to make the update and manually key in data
- Manual data entry is not real time, which means your inventory can lag physical events
- There is no validation of the locations that samples have been picked or placed to

Accurate and speedy sample picking and placing in manual stores is a daily requirement in the biopharmaceutical industry. The information about where exactly a sample is stored is likely to be held in specialist sample management software or a laboratory information management system (LIMS) to provide traceability and the audit trail that is essential to good laboratory practice and often a regulatory requirement.

How do you ensure that the sample location and other essential information held in your inventory is available to you when you are standing in front of the store(s) wanting to find or return a sample?

This application note describes the benefits of providing an augmented reality (AR) interface to your Mosaic sample management inventory by integrating Mosaic software and a pair of Smart Glasses. This is used primarily for hands-free picking and placing in manual stores without having to interact with a desk-based, tablet computer or printout. In addition, relevant information on labware and instrumentation can be delivered via the smart glasses.



THE BENEFITS OF MOSAIC'S AR APPLICATION

Pairing Mosaic sample management software with smart glasses gives you a portable inventory interface where information is delivered as you need it.

Its main benefits are:

- Sample location changes are automatically confirmed in real time
- Errors are reduced by avoiding manual data entry
- Inventory updates are auditable as workflow status is constantly updated in real time
- User guidance is context-sensitive, being displayed as it is required

For the user, it means:

- Both hands are free to perform tasks
- Time spent picking and placing is reduced as they are guided straight to the correct manual stores, shelves and labware
- While on the move, they can see sample details, what should be done next, hazards and so on
- They can also check the status of laboratory instrumentation

COMPATIBLE GLASSES

Implementing Mosaic's AR interface is simple, requiring Mosaic 8.4 or above (or server-side update to Mosaic 7) plus a wi-fi connection and the following hardware:



Vuzix Smart Glasses – M300 / M300XL / M400



An optional bluetooth (paired) barcode scanner
– e.g. Koamtac KDC270Ci



SUPPORTED OPERATIONS

To carry out operations using the Mosaic's AR application, the user must be wearing smart glasses which are logged into Mosaic software via wi-fi and which are optionally paired with the Bluetooth barcode scanner, if needed.

The operations supported by Mosaic AR are:

- View sample information
- Fulfil pick list
- Fulfil place list
- View details of work on integrated equipment

USE CASE 1: VIEW SAMPLE INFORMATION.

In a busy laboratory there may be many items of labware waiting to be processed. A user can get immediate feedback on the status of a sample by scanning the labware barcode with the glasses or Bluetooth scanner.

This will display the following information:

- Substance details (tubes only)
- Any hazard information recorded
- Number of orders for the sample (if any)
- Expiry information (if any has been set)

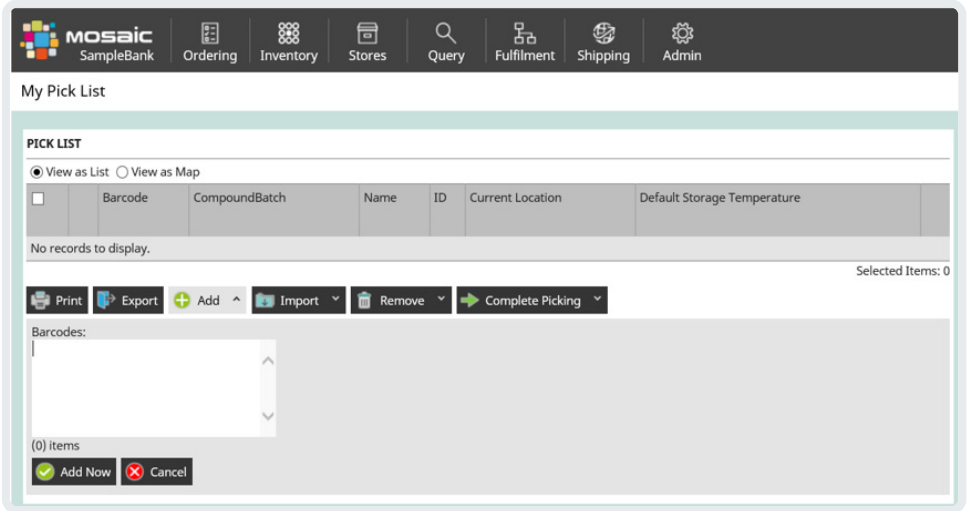
USE CASE 2: FULFIL PICK LIST

Users often need both hands when picking items from a store – particularly when gloves are required to move samples.

Having created a Pick List of the labware items required for picking (for an order, inventory search, etc.) the Mosaic AR application will guide the user through the picks one by one by using the smart glasses to display:



- The number of items to be picked in an X,Y format (store – shelf – position)
- The labware type, barcode and any hazard information recorded
- The store name, shelf name and location of the next item to be picked

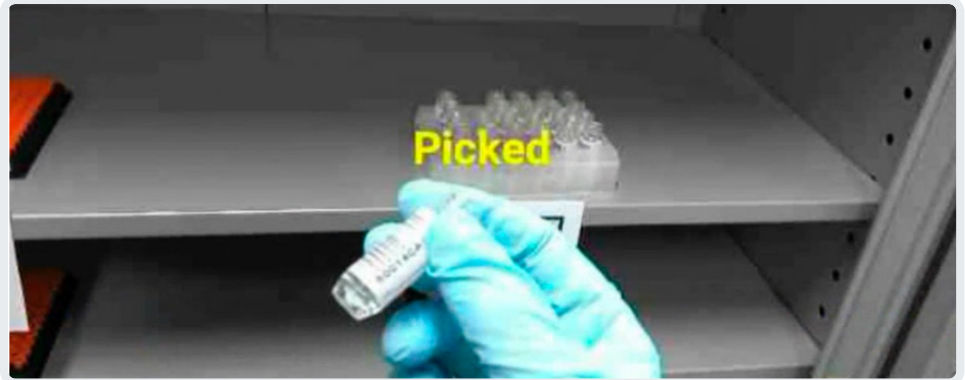


When the user views the store and/or shelf barcode, the AR application will highlight the correct location with an overlaid green circle. Red crosses indicate incorrect locations when more than one barcode is within the glasses' field of vision.



Scanning the labware barcode confirms the pick. If the correct item has been picked:

- The user receives both a visible and audible confirmation the item has been picked
- Mosaic's location and audit trail information is updated in real time
- The item is removed from the users Pick List and the smart glasses show the next pick item location



If an incorrect item has been picked

- The user is informed
- No information in Mosaic is updated
- The location information for the correct pick is still displayed

The Mosaic AR application optimises picking by guiding operators to pickings in the same location first. On completion a "Pick List complete" message is displayed.

USE CASE 3: FULFIL PLACE LIST

It is also an advantage to have both hands free while storing samples. Once a Place List of the labware items to be stored is selected the AR application will guide the user through the places one by one by using the smart glasses to display:

- The number of items to be placed
- The first labware barcode to be placed, its labware type and any hazard information recorded



Once the first barcode is scanned to confirm it is correct, the glasses will display:

- The store name, shelf name and rack location to put the labware

When the user views a store and/or shelf barcode, the smart glasses highlight the correct barcoded location with an overlaid green circle.

Once the correct location has been identified, the user scans the labware to confirm the place. If the correct item was placed:

- The user receives both a visible and audible confirmation the item is correctly stored
- The location and audit trail is updated in Mosaic in real time
- The item is removed from the user's Place List and the smart glasses display the next item to be stored

If an incorrect item has been scanned:

- The user is informed
- No information in Mosaic is updated
- The information for the correct place is still displayed

The Mosaic AR application optimises storing by guiding operators to placings in the same location first. On completion a "Place List complete" message is displayed.

USE CASE 4: VIEW DETAILS OF WORK ON INTEGRATED EQUIPMENT

Modern laboratories contain a lot of instrumentation to help process samples efficiently. As part of Mosaic's efficient workflow management, the status of the instrument can be checked using the AR application if that instrument is integrated with Mosaic. Perhaps you want to know what job a particular machine is currently running, to know when it might become available and what to run next. Or perhaps, you want to check if there any job that could be run on a currently idle machine?

To check the instrument status, simply view the instrument's QR code. The Mosaic AR application displays information about the instrument using the smart glasses, including:



- The machine name
- The current in-progress order number and workflow operation
- A list of order numbers and workflow operations that could be run on the instrument.



SUMMARY

Mosaic's AR application combines with smart glasses to give you a practical and portable inventory interface, where information can be delivered as you need it. Mosaic AR is available with Mosaic 8.4 or above or with a server-side update to Mosaic 7.

Using the Mosaic AR application is as simple as scanning a barcode with the glasses or the Bluetooth scanner. This can:

- Display sample information
- Start a pick or place operation
- View instrument status information

Mosaic's AR application provides the following benefits:

- Sample location changes are automatically confirmed and verified in real time



- Errors are reduced by avoiding manual data entry
- Inventory updates are auditable as workflow status is constantly updated in real time
- Information is displayed where and when it is needed, as the interface is mobile and context sensitive
- Users have both hands free to perform tasks
- Time spent picking and placing is reduced as users are guided straight to the correct manual stores, shelves and labware
- Workflows are optimised as users can check instrumentation status or sample details on the go

By providing a simple and practical interface to manual stores, Mosaic AR brings traceable and verifiable electronic updates to the physical storage and retrieval process. This portable interface finally makes possible auditable updates to manual processes. It can also bring legacy systems up to the standards expected of a modern laboratory.

ABOUT TITIAN SOFTWARE

Titian is the industry leader in providing sample management software for the Life Sciences. Using our Mosaic software, our customers see significant benefits in terms of throughput, response times, error rate reduction, sample conservation and cost savings due to markedly reducing the labour associated with managing sample collections. We also use our experience of integrating laboratory instrumentation and robotics into our systems to ensure that our clients make best use of their investment in research and development technologies.

At Titian, our development efforts never stop as we continue to advance Mosaic toward higher levels of efficiency and practicality for the user. The ongoing collaborative relationship between Titian and hardware vendors continues to ensure that new applications are made available on a timely basis to fulfill our customer's research goals. We pride ourselves on taking into account customer feedback for all of our Mosaic applications to drive our product to be the best it can be. It is all part of Titian's commitment to providing innovative solutions that make life easier for sample management professionals.



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Roger Martin worked for GlaxoSmithKline for 33 years. Originally a medicinal chemist working as a research chemist, he later transitioned to cheminformatics and then R&D IT, specialising in compound management software. He joined Titian Software in 2012 where he is a technical application consultant.





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