

XChem Laboratory Puck Scanner Algorithm and Result Visualisation

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INTRODUCTION

Macromolecular Crystallography (MX) facilities are known for using many samples and require software tools which can help to track samples and to maintain the correct sample processing order. Puck Scanner is used on an everyday basis by the XChem Laboratory and helps researchers to track samples.

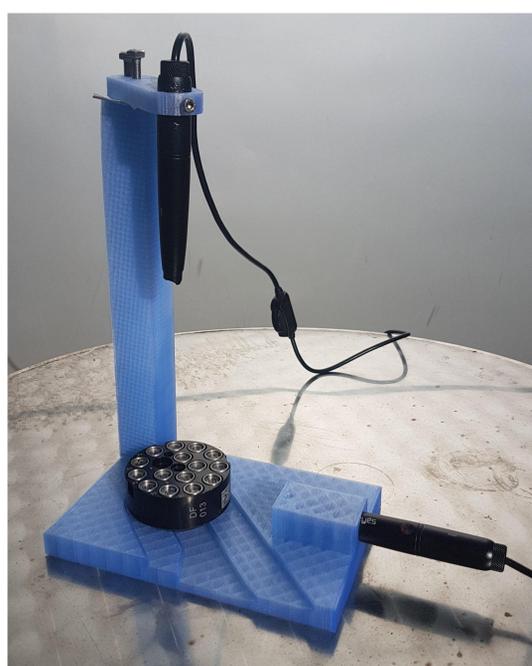
PROCEDURE

Puck Scanner is used to scan the Data Matrix codes placed on top of each sample pin (Fig.1d) and on the side of the ‘puck’ in which the pins are stored (Fig.1b and Fig.1c).

A laboratory stand with two camera slots - one for the camera pointing at the side code and one for the camera pointing at the top of the puck - has been designed at Diamond Light Source (Fig.1a).

When Puck Scanner is running it attempts to detect a code in the field of view of the side camera. Once it is successfully detected and scanned the view switches to the top camera and Puck Scanner attempts to read as many codes as it can from the top image.

COMPONENTS



(a) Laboratory stand



(b) Puck - top



(c) Puck - side



(d) Sample pins

Fig.1. System components

DATA MATRIX

Data Matrix codes are two dimensional codes. Each Data Matrix code contains two adjacent solid borders which create an ‘L’ shape pattern (Fig.2). This pattern can be used to detect the codes in an image.



Fig.2. Data Matrix

METHOD

Code Locator

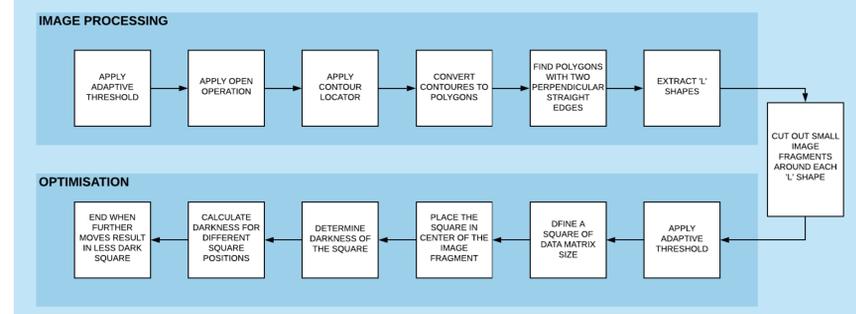


Fig.3. Code Locator - steps. Adaptive Threshold and Open Operation are well established image processing methods implemented in OpenCV .

Puck Locator

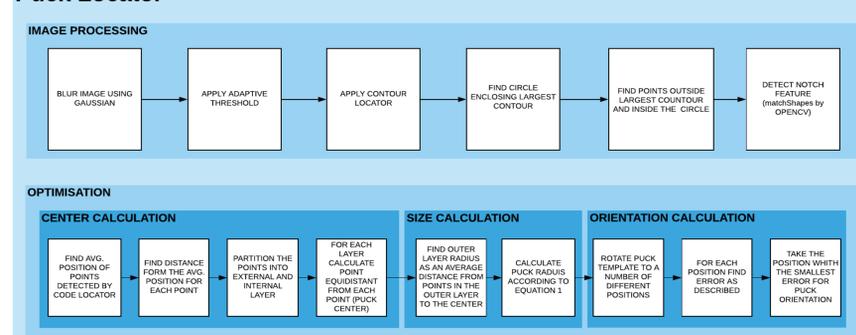


Fig.4. Puck Locator - steps. Adaptive Threshold and Open Operation are image processing methods implemented in OpenCV.

RESULTS

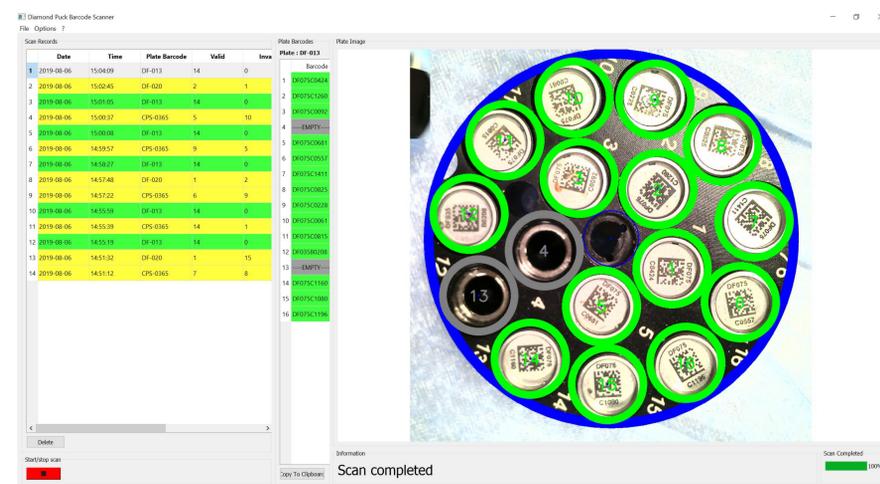


Fig.5. Graphical User Interface - scan record table visible on the left hand side, start/stop button in the bottom left corner, code table in the middle, image frame on the right hand side and progress bar in the right bottom corner

CONCLUSION

Thanks to Puck Scanner, researchers don't have to scan pins manually one by one to track their samples. Every month around four hundred pucks are scanned in XChem laboratory. The scanner has been constantly in use for the last two years.

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