

INTRODUCTION

We believe there are six main weaknesses in the current incarnation of ONYX™ that need to be addressed right now.

1. More robust liveness detection
2. Adaptation to work with device manufacturers who have not implemented the Android Camera2 protocol correctly and/or have non-standard auto-focus algorithms
3. Improvement to our finger detection algorithm
4. Better scale tolerance for matching
5. Real-life testing in the appropriate markets and with the appropriate populations
6. Obtaining certifications from national certifying bodies and national ID systems

Initially, ONYX was developed to perform 1:1 on-device matching. We found that many of our clients needed 1:N on-server matching and the ability to match legacy inked prints. ONYX has been modified to meet these needs, but the original architecture design is becoming more and more problematic.

We have developed a way to re-architect the system, and implementing this will improve finger detection, scale tolerance, and legacy matching.

LIVENESS DETECTION

Our liveness detection algorithm is completed, but has not yet undergone the machine learning portion of development. For this, we need a large sample set of color finger images, which we are now collecting. One of our partners, Precise Biometrics (formerly NexID) will provide us with 25,000 images taken from silicone, wax, wood glue, putty & gelatin fakes. Without going into too much detail, the computer will learn the difference between real and fake fingers. We have also developed a testing protocol with Precise Biometrics to provide quantitative results to clients.

DEVICES WITH NON-STANDARD AUTO-FOCUS ALGORITHMS

We felt there was little we could do about this issue, but Samsung (on whose devices most of our issues are occurring) has recently opened up a new camera API. This may allow us to solve the problems with Samsung devices.

IMPROVEMENTS TO FINGER DETECTION ALGORITHM

Currently, our software crops out the portion of the camera-acquired image based on where we think the finger is within the frame. Our new algorithm determines the exact position, size, and orientation of the finger pad.

BETTER SCALE TOLERANCE

Under our current architecture, different devices provide ONYX with different sized images. Even with image pyramiding, scale is our biggest hurdle to more accurate matching, especially against inked prints. Our new architecture will provide images with a uniform scale across all devices and platforms.

RIGOROUS TESTING

Our current test results, although favorable, are outdated. The last independent test data we have is from 2014, which is three major releases ago, and many improvements have been made since then. We need test results in the following areas:

1. Usage testing with the local population in the geographic areas in need of financial inclusion
2. Independent confirmation of our internal liveness detection results
3. Testing on phones and devices that are common in areas in need of financial inclusion
4. A/B and multi-variant UI/UX testing to fine-tune the experience for our target population

CERTIFICATIONS

Since optical fingerprint capture is such a new technology, most certifying bodies have not yet developed a set of standards to certify optical capture devices. We would like to create a sense of urgency for the development of those standards. For example, we have shown compatibility with AADHAAR, but do not have a document from STQC stating we are a certified solution.

IMPROVED ARCHITECTURE IMPLEMENTATION	
Development	\$7,200.00
LIVENESS DETECTION	
Development	\$7,200.00
AWS Machine Learning	\$9,600.00
Fabrication of Fake Fingers	\$16,000.00
Post-testing Refinements	\$2,400.00
NON-STANDARD AUTO-FOCUS COMPATIBILITY	
Development	\$4,800.00
Post-testing Refinements	\$2,400.00
FINGER DETECTION ALGORITHM	
Development	\$7,200.00
Post-testing Refinements	\$2,400.00
IMPROVED SCALE TOLERANCE	
Development	\$4,800.00
Post-testing Refinements	\$1,200.00
TESTING	
Independent Testing Lab	
In-country Testing	\$14,760.00
Purchase of Test Devices	\$1,281.00
Overall Post-testing Refinements	\$4,800.00
TOTAL	\$86,041.00

