

# AARI<sup>®</sup>

AMINO ACID RAPID IMAGER

STREAMLINED VISUALISATION  
AND MARK-UP OF FINGERMARKS



**Fully-Integrated Fingerprint Imaging System  
with AI Assisted Ridge Detection**

*Patent Pending. United Kingdom Patent Application No. 2105348.3*

**foster+freeman**  
FORENSIC SCIENCE INNOVATION

# AAR<sup>®</sup>

## AMINO ACID RAPID IMAGER

Dramatically increase the speed and accuracy of fingerprint visualisation on items of porous/semi-porous evidence using a fully-integrated detection and imaging system with intelligent AI Assist Ridge Detection software.

Designed to meet the demands of busy fingerprint laboratories, **AARI** Amino Acid Rapid Imager combines multi-spectral illumination and a high-resolution UV-Vis-IR camera, equipped with wavelength-specific imaging filters, for the rapid detection and photography of fingermarks on evidence up to A4/Letter size.

**AARI** streamlines a previously time-consuming process by combining the illumination and photography of marks and by providing a unique AI Assist software tool to recognise areas of ridge detail and locate the presence of fingermarks.

Tasks that previously took many hours of manual processing can now be achieved in minutes.



## AARI TECHNOLOGY

### High-Res Image Capture

- Image documents up to A4 size
- 61MP UV/colour/IR camera
- High-resolution 1460ppi imaging
- Automatic filter selection

### Multi-Spectral Illumination

- Diffuse 5700K white light
- UV 365nm
- Green 520-530nm
- Infrared 860nm

### Intelligent Software

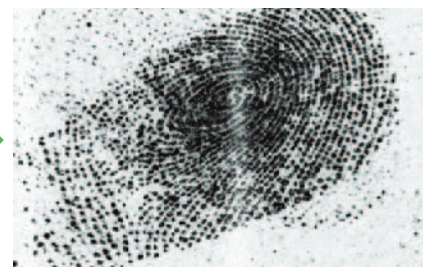
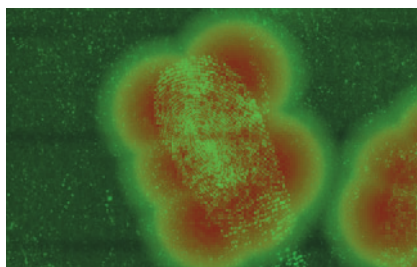
- Quick-start examination presets
- AI Assisted ridge detail detection
- Manual or Auto print mark-up
- Simplified reporting

# VISUALISE AND MARK-UP PRINTS IN MINUTES NOT HOURS

From placing a document onto the examination bed to exporting a comprehensive report, fingerprint processing using AARI is fast and efficient.

Using pre-set examinations or full-manual operation, the AARI all in one illumination and imaging system can quickly reveal and photograph fingerprint marks.

Marks treated with amino acid reagents including, Ninhydrin; 1,2-Indandione; and DFO, as well as other commonly used treatments and processes including, Cyanoacrylate; Physical Developer; VMD; Silver Nitrate; Iodine; Oil Red O and more, can be visualised and captured in minutes.



## FLUORESCENT PRINTS IN SECONDS

### Pre-set Examinations

Pre-configured illumination and image capture settings allow for quick-start imaging of commonly used fingerprint treatments.

### AI Assisted Ridge Detection

AARI advanced software assistant uses an AI-trained algorithm to quickly scan documents and identify areas of ridge detail.

### Rapid Mark-up and Reporting

Following the manual or AI-assisted mark-up of prints, high resolution images may be exported to a PDF report complete with full audit trail.



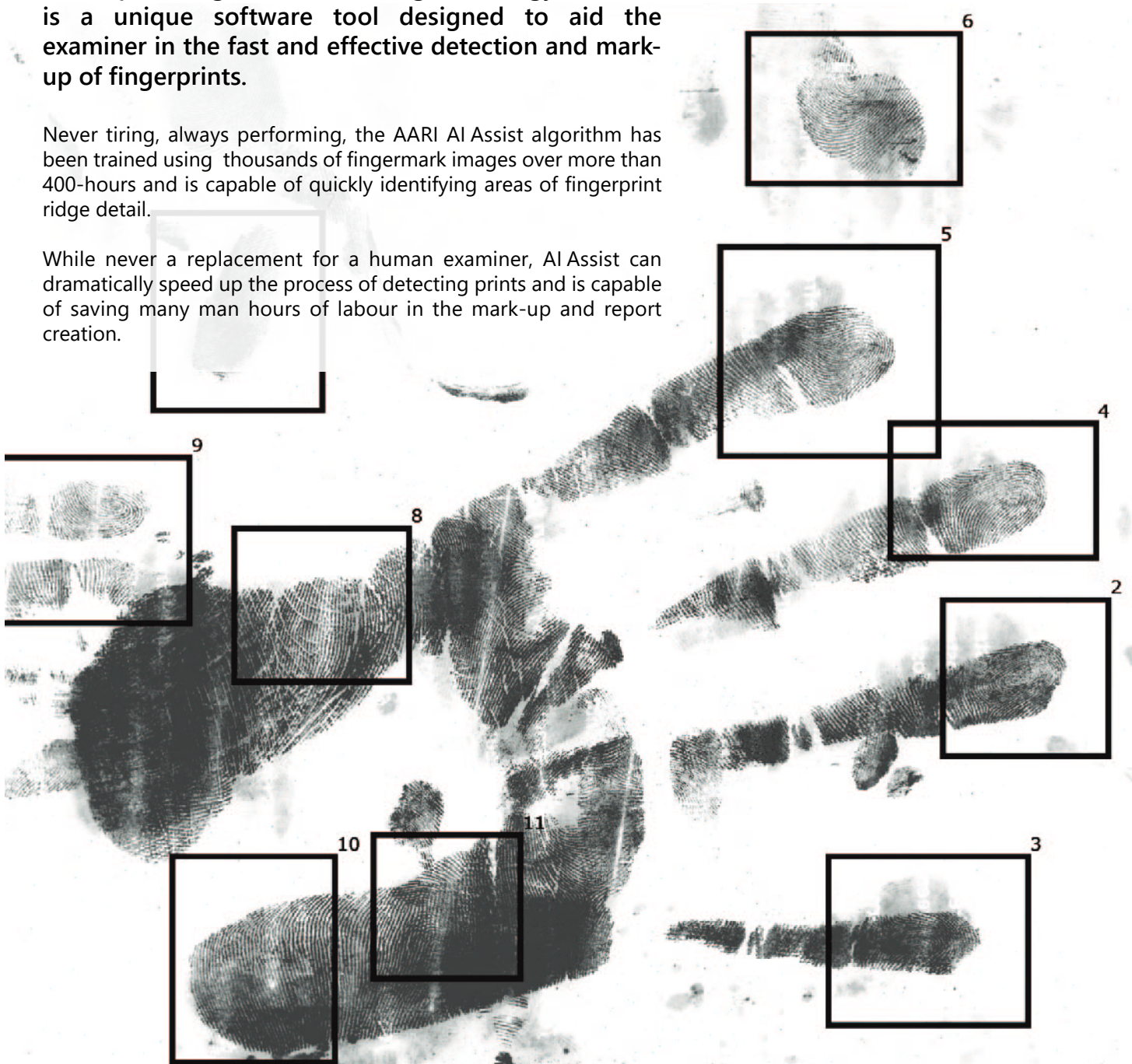


## AI ASSISTED RIDGE DETECTION

Developed using Machine Learning technology, AI Assist is a unique software tool designed to aid the examiner in the fast and effective detection and mark-up of fingerprints.

Never tiring, always performing, the AARI AI Assist algorithm has been trained using thousands of fingermark images over more than 400-hours and is capable of quickly identifying areas of fingerprint ridge detail.

While never a replacement for a human examiner, AI Assist can dramatically speed up the process of detecting prints and is capable of saving many man hours of labour in the mark-up and report creation.



### WHAT IS AI ASSIST?



**AI ASSIST** is a unique software tool that assists the examiner by detecting regions of interest containing fingermark ridge detail. The software can significantly speed up the process of fingerprint detection and mark-up.



**AI ASSIST** is *not* intended to replace the role of a skilled fingermark examiner. All AI ASSIST detected marks should be manually verified. The software does not identify suspects via their fingerprints.

# RAPID VISUALISATION AND REPORTING

Using pre-set examinations, fingerprint experts can capture high-resolution images of entire documents, under various illumination conditions, in a matter of seconds.

Ninhydrin on glossy magazine		
Pre-set	Illumination	Imaging Time
Nin 1	520 - 530nm   Green	30 Seconds

Latent marks processed using ninhydrin develop in the visible red range and do not exhibit fluorescence.

Best results are achieved by imaging marks under green illumination to increase contrast.



Vis illuminaion | No Filter



AI Assist | Heat map

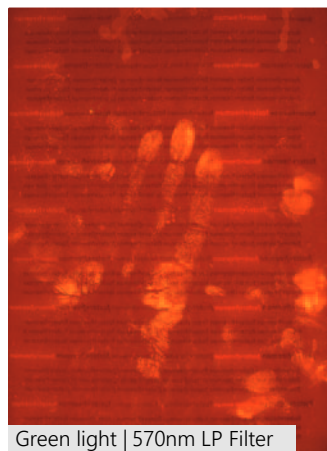


Output

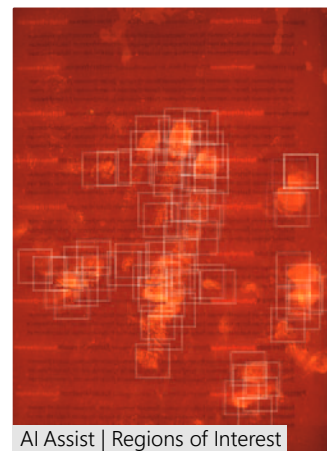
DFO on Glossy Printed Paper		
Pre-set	Illumination	Imaging Time
DFO 1	520 - 530nm   Green	30 Seconds

Highly fluorescent, DFO requires appropriate excitation wavelengths and viewing filters to be selected when visualising developed marks.

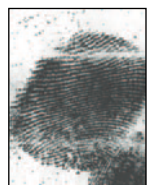
Typically, best results are achieved using green illumination, captured via a narrow-band 570nm longpass filter to suppress any background fluorescence.



Green light | 570nm LP Filter



AI Assist | Regions of Interest



Output

1,2-Indandione on Newspaper Print		
Pre-set	Illumination	Imaging Time
Ind 1	520 - 530nm   Green	30 Seconds

Fingermarks developed using 1,2-Indandione are coloured pale pink when viewed in the visible, and can be seen to fluoresce brightly when illuminated using green light and captured via a 568nm filter.

Background fluorescence is minimised thanks to the use of extremely narrowband (10nm bandwidth) green illumination.



Green Light | 568nm BP filter



User confirmed marks



Output

More examples and a video demonstration can be found here: [www.fosterfreeman.com/AARI.html](http://www.fosterfreeman.com/AARI.html)



# AARI SYSTEM SPECIFICATIONS

AARI Amino Acid Rapid Imager is a compact laboratory solution for the visualization, imaging, and digital mark-up of fingermarks on porous evidence (primarily documents). The AARI system comprises the main AARI unit, a desktop PC and monitor.

## IMAGE CAPTURE

- High resolution 61MP mirrorless digital camera
- Sensitive from 365-860nm
- Standard (730 ppi) and pixel stepped (1460 ppi) imaging
- Nominal FOV of 330mm x 220mm
- Capture A4 (297 x 210mm) and US letter (280 x 216mm)
- Alignment guides/markings aid document positioning
- Removable lid to accommodate large format items
- Motorized filter mechanism containing:
  - 10nm narrowband filter centered at 568nm
  - 570nm Long Pass filter
  - RG715 filter
  - Visible band filter

## ILLUMINATION

- Provides even shadow-free illumination across the entire FOV in UV, IR and green illumination modes
- Manually adjust the brightness of all light sources
- Integral LED illumination sources include:
  - Diffuse white 5700K
  - IR 860nm
  - Green 520-530nm
  - UV 365nm

## HARDWARE

- System dimensions: H 369mm x W 520mm x D 562mm
- System weight: <25kg
- Integrated carry handles
- Connects to PC via USB3.1 SuperSpeed interface
- Integrated 10.1" touch screen
- Passive cooled, fan-less design
- Easy to wipe clean surfaces
- Supplied with a dust cover
- Conforms to EN62471 and EN61010-1:2010 standards

## HARDWARE | PC/MONITOR

- High-specification desktop PC, with internal SSD and a minimum of 3x USB 3.1 ports
- 32" self-calibrating 4K monitor

## OPTIONAL ACCESORIES

### Anti-Vibration Table (AVT)

QCL/AARI/ACC/1

- 60 x 60cm isolation platform
- To ensure a stable operating environment for processes sensitive to mechanical vibration
- Removes up to 98% unwanted vibration

*Patent Pending. United Kingdom Patent Application No. 2105348.3 | Specifications and data are subject to change.*

## SOFTWARE

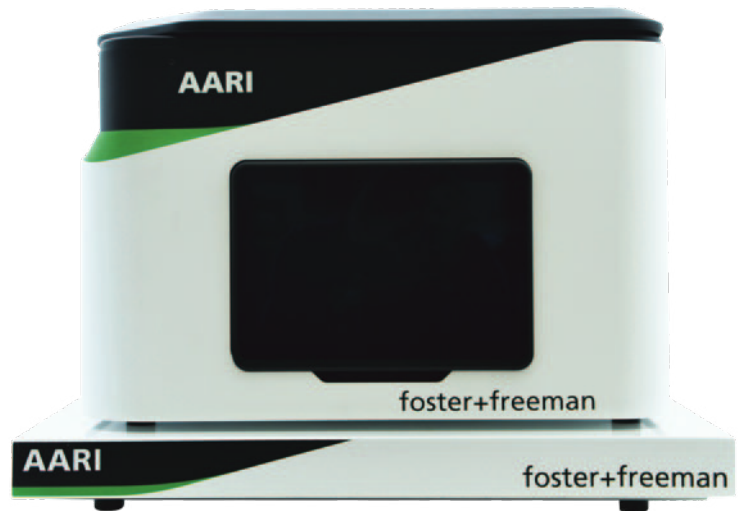
- Dedicated software package provides complete control of the AARI system via desktop PC.
- Image capture functions include:
  - Rapid capture of images in <30 seconds
  - Complete control of camera ISO, Exposure, and F-number, Pixel-Stepping and Image grabbing.
  - Live image view for easy alignment of documents.
  - Optional flat field imaging.
  - Complete control of individual light sources.
  - Manual and automatic filter selection.
- Image Enhancement options:
  - Greyscaling & inverting
  - Image flip and rotation
  - Cropping and image markup
  - RGB Colour adjustment
  - Contrast stretching
  - Hue Saturation Luminance (HSL)
  - Image Sharpening
  - Full image history for back-tracking through recent edits
- AI Assist Ridge Detection
  - Automated identification of fingerprint ridge detail
  - Automated detection and mark-up of regions of interest
  - Labels user-confirmed regions of interest
- Preset examination modes for detection of:
  - DFO developed fingerprints
  - 1,2-Indanedione developed fingerprints
  - Ninhydrin developed fingerprints
  - PD developed fingerprints
  - Oil Red O developed fingerprints
  - Iodine developed fingerprints
- Customizable reporting functionality:
  - Customize print layout and laboratory logo
  - Crop and annotate (manual digital mark-up) images
  - Export completed reports in PDF format.
- Image archiving system:
  - Store images on a local (or networked) file location
  - Automatically save images as TIFF, JPEG, BMP
  - Audit trail stored alongside images.
  - User profiles to create and review reports and aid the identification in the audit trail.
- Diagnostics
  - Self-check function to monitor LED power levels.
  - Generate service reports.
- Touchscreen Interface
  - Simple streamlined operation of AARI system.

## Anti-Vibration Table (AVT)

Ensure a stable operating environment for processes sensitive to mechanical vibration

By removing up to 98% of unwanted vibration, this 60x60cm anti-vibration table (designed for use with high sensitivity instruments) can be supplied alongside the AARI in laboratories where low-level vibrations has the potential to effect system performance.

The low natural frequency of the isolators built into this platform ensures that vibrations common in most laboratories are effectively removed, greatly increasing instrument performance.



*An optional accessory, the AVT eliminates unwanted vibrations*



### Eliminates horizontal and vertical vibrations

Equipped with sorbothane isolators, the AARI AVT provides outstanding damping performance to eliminate any rocking or wobble during the imaging process.

Sorbothane rapidly damps down disturbances to the AARI camera, protecting the system from both horizontal and vertical vibrations transmitted through floors, walls and benches and caused by footsteps, traffic, lifts/elevators and numerous other sources.

### Anti-Vibration Table (AVT) for use with AARI Imaging Systems

Order # QCL/AARI/ACC/1

- 60 x 60cm isolation platform
- Low frequency sorbothane isolators built-in
- Removes up to 98% unwanted vibration
- Working Height 55mm
- Capacity 25kg (55lbs)