Automated Virus Pathology Testing in the Field

Uncloaking the invisible enemy

Problem Statement

- COVID-19 has shown the limitations of traditional wet chemistry testing to adapt to novel viruses and scale rapidly with high efficacy
- Society needs the ability to screen people rapidly as they transit between perimeters to protect from biological threats
- Lab capacity, trained personnel and turn around speed, limit the practical implementation of mass screening
- Immunity to influenza and coronaviruses can be short lived and cannot assumed to be guaranteed or indefinite after recovery, along with the threat of dormant virus reactivation e.g HPV
- Surveillance for novel threats from mutations of existing human pathogen species(ie COVID-19) or novel biological organisms

A different approach...

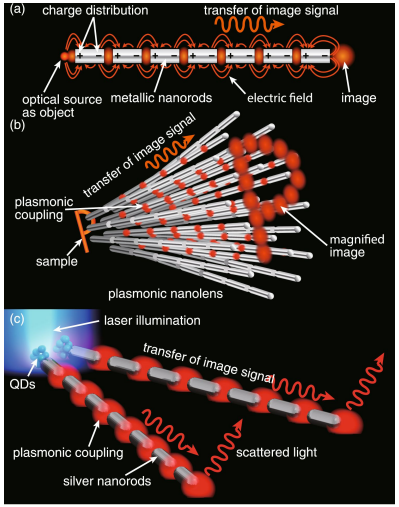
- Real time point of use sample Microscopy
- Automated cell pathology on the biological needle in a haystack threat
- Optical microscopy at the nano cellular scale
  - Combining multi spectral UV imaging, plasmonic nanolens, through AI NN super resolution
  - Replaces need for bulky & expensive electron microscope
- Single simple automated terminal for screening or surveillance, antigen or antibody detection

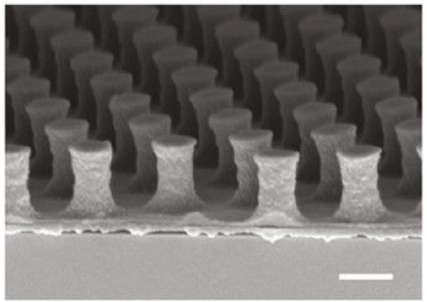
Advantages new approach

- Move from Wet Chemistry to Solid state imagining - no more consumables or logistics
- Scaling up well understood biological research method to mass field application utilising latest technology
- Physics levels of accuracy and specificity
- Moments not hours for results
- Fully digitised data recording of results for analytics

Super Resolution Nanolens

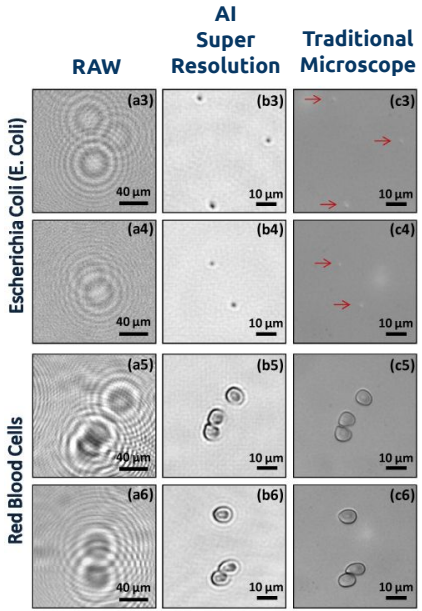
How Nanolens works



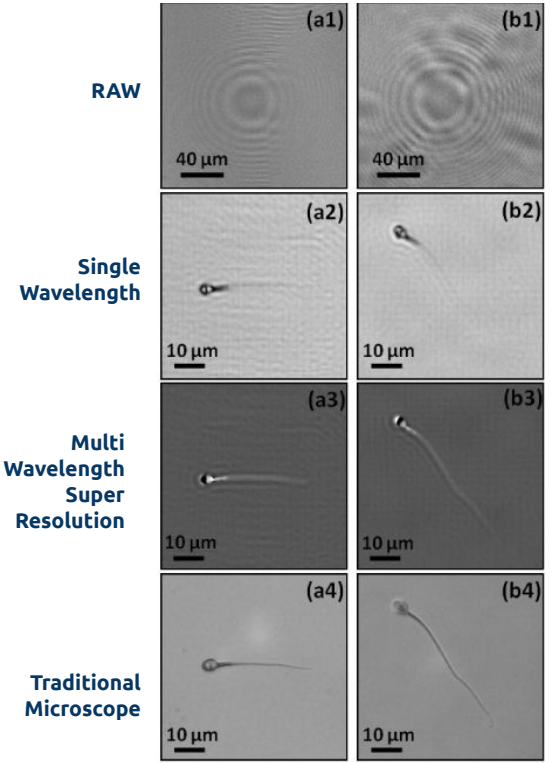


Available from https://www.photonis.com/

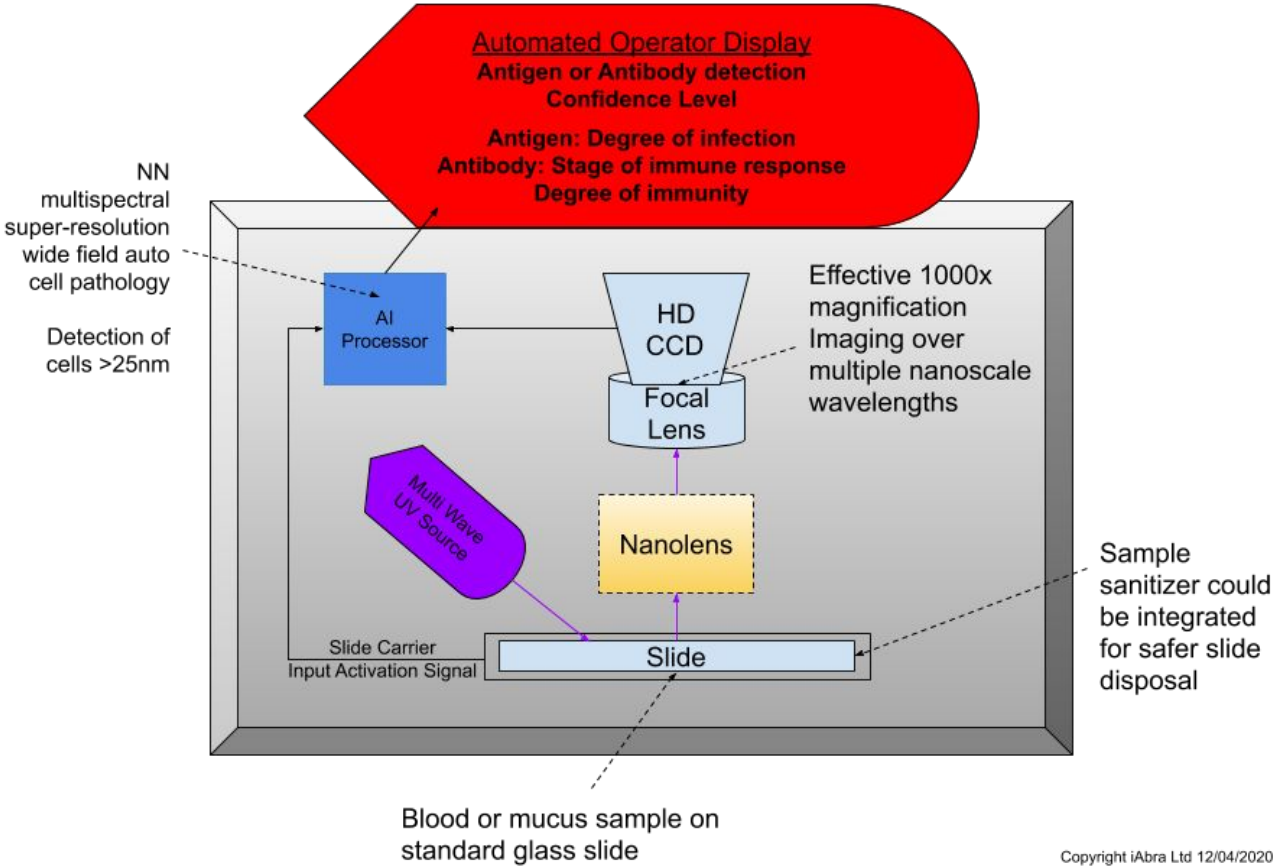
Single Wavelength



Multi Wavelength



Proposed Device Architecture



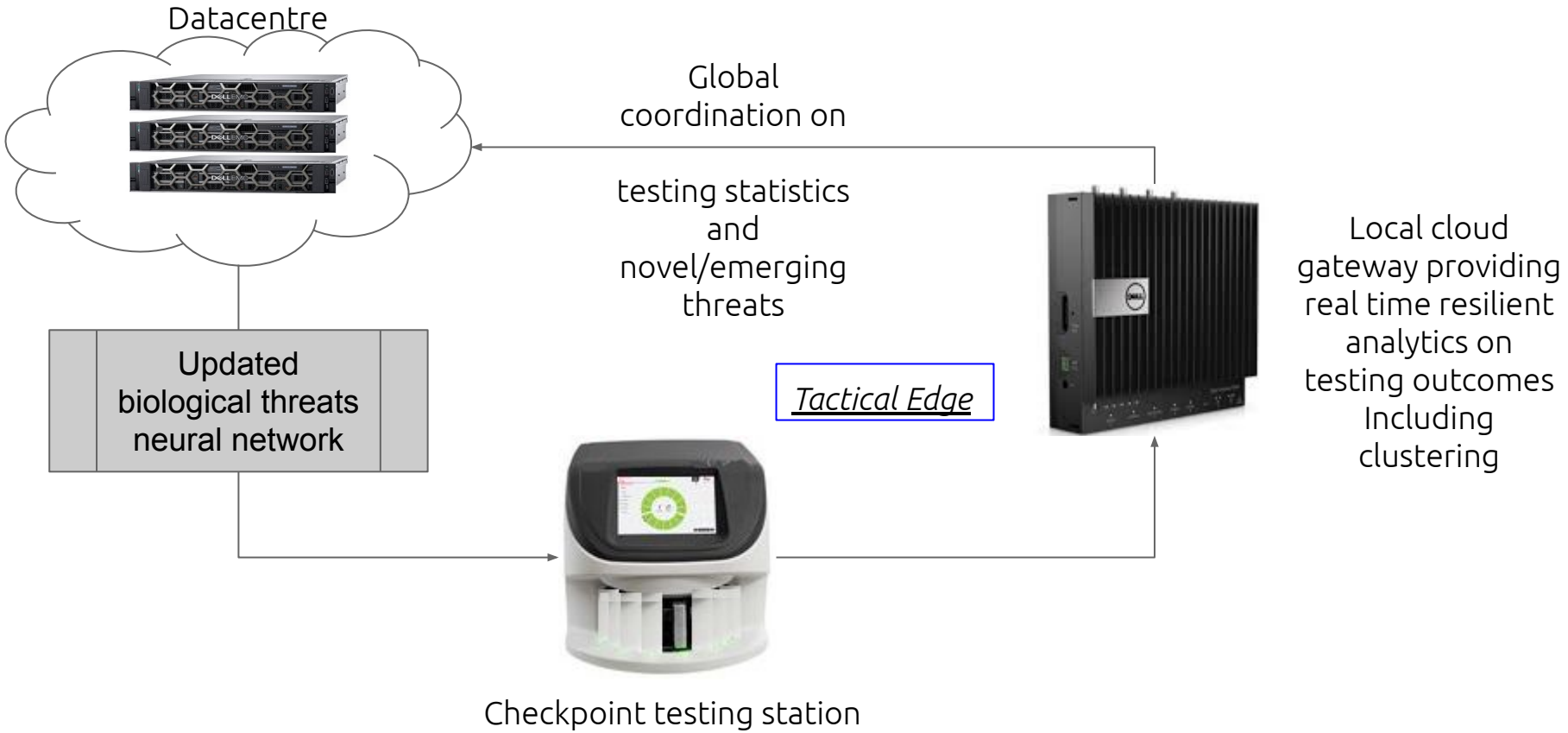
System Features

- Slide insertion auto process
- <5 sec slide to results
- Domain expert(bioscientist) retrainable and over the air update for new and emerging biothreats
- Anomaly detection for surveillance early warning (unknown cell types)
- Integrated data structuring for epidemiology analytics
- Nanoscale multispectral imaging and AI recognition @ 25nm
- Automated Operator Display
  - Antigen or Antibody detection
    - Confidence Level
  - **Antigen**:
    - Degree of infection[cell count]
  - **Antibody**:
    - Stage of immune response[immune cell type]
    - Degree of immunity [antibody quantities]
- Support multiple types of sample slides ie blood, mucus, saliva etc

iAbra Expertise

- Spotting needle in a haystack from the very large to the very small
- Semantic segmentation of huge clustered images
- High efficiency tactical edge deployed neural networks
- Turn key AI, rapidly empowering domain experts
- Optical AI systems integration

End2End System Architecture



Proposed Programme Flightpath