

Multi-spectral Imaging for Skin Cancer Margin Detection

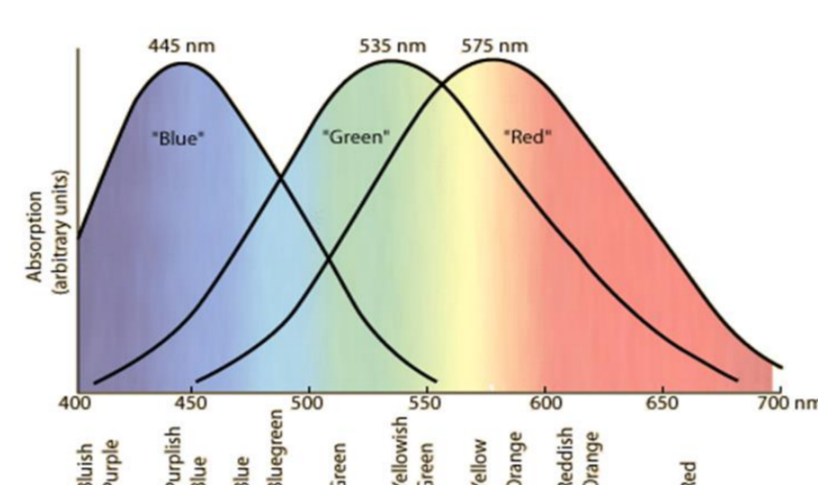
Background to the Project

Project Background

- The concept behind this project was to research, develop designs and inevitably build a multi-spectral imaging device which will have up to 16 different colour LED chains.
- Together with the device, a means of acquiring and storing the data was constructed for the advantages of data integrity, confidentiality and analysing the images at a later time.
- Spectral Imaging shows great promise for medical applications due to its non-invasive nature.

Multi-Spectral Imaging

- The information gathered from this procedure can broaden the understanding of an object, its composition and structure by viewing the object through a range of spectral wavelengths.
- A multi-spectral camera will capture multiple different wavelengths and have a separate value for each wavelength, which means each pixel will have a different spectral signature



Equipment Needed

- Imaging Source Camera



- Multispectral Source



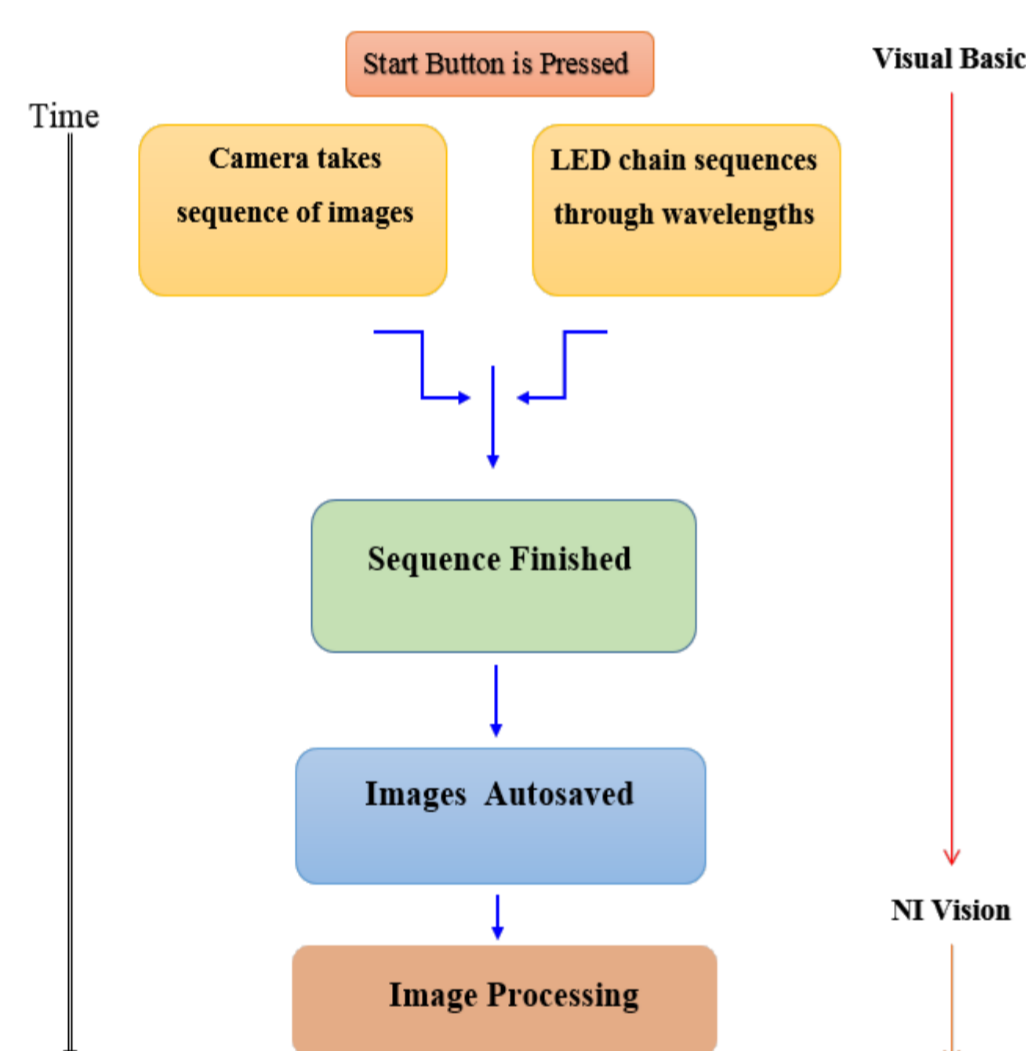
Testing Method

- The object under test should have the same, or close to the same optical properties of human skin.
- A phantom was constructed by using a rubber like material called Polyurethane.
- Uniform absorbing and scattering substances were added before and after hardening, i.e. Titanium dioxide and ink.

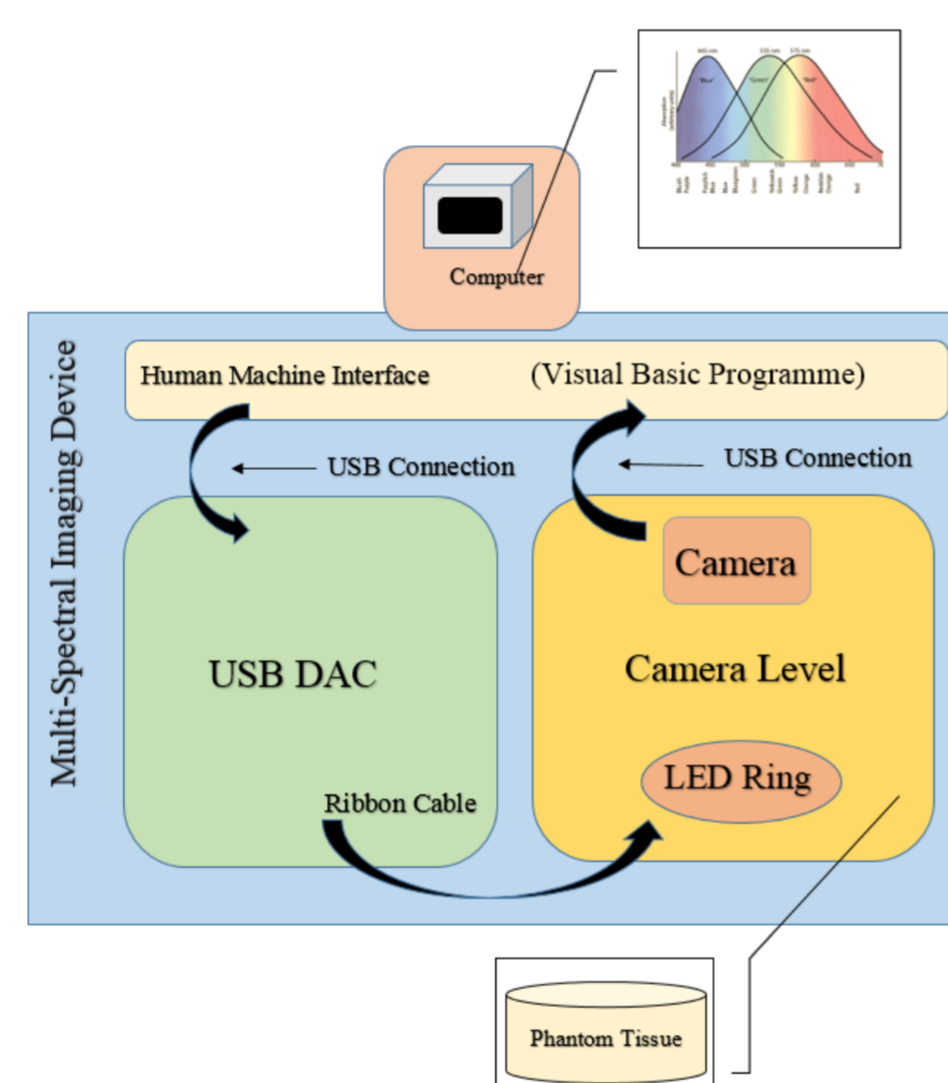


Project Plan

Flow Diagram

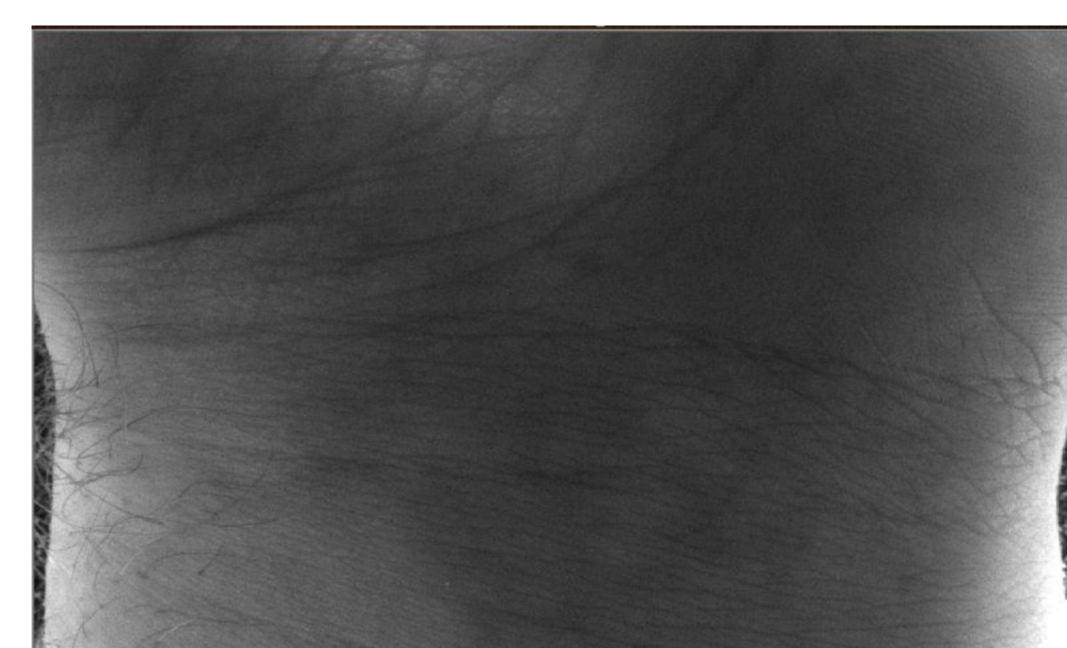


Device Diagram



User Interface

- Simple user interface design
- "Plug and Play"



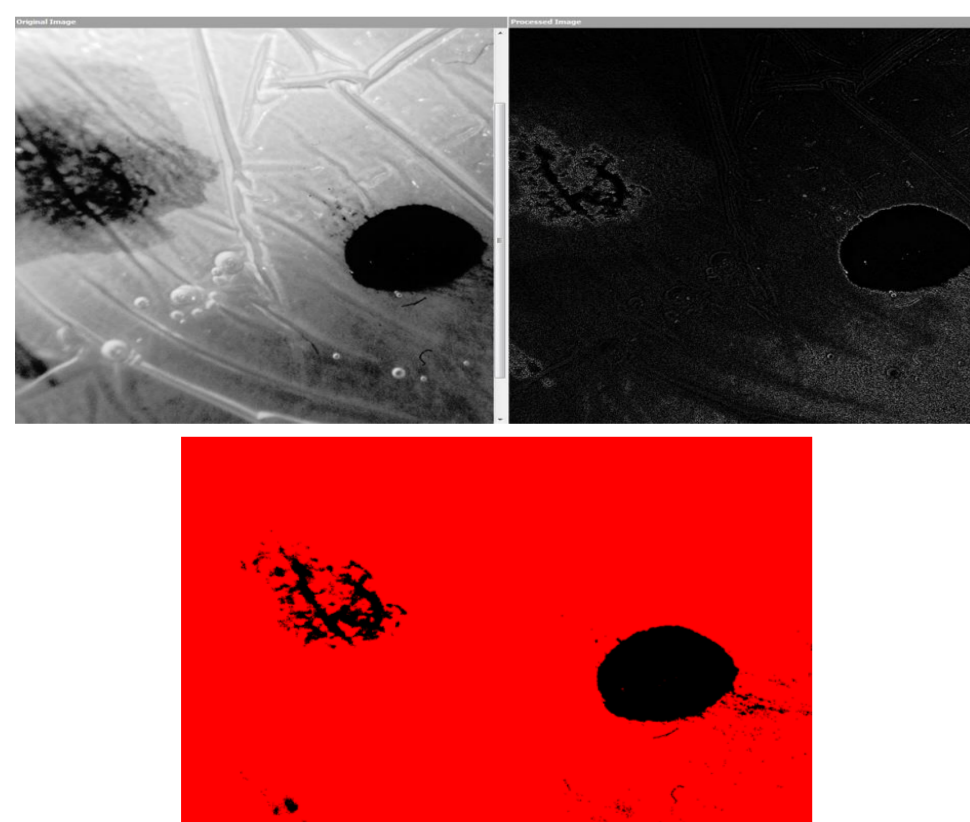
Finished Device



Results

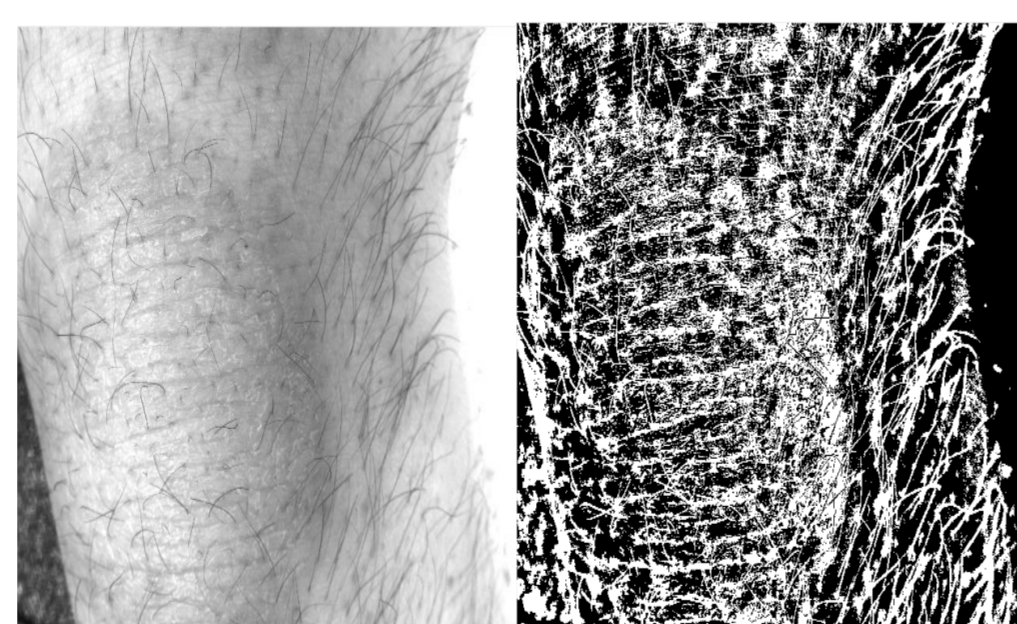
Margin Detection

- Through image processing, margin detection shows great detail of the area under examination.



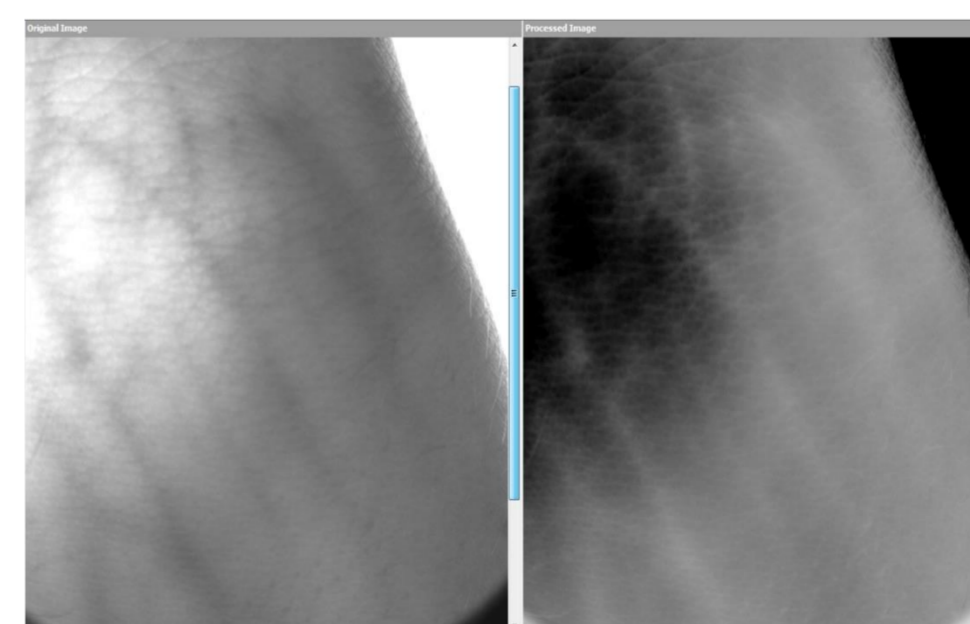
Dermatitis

- Haemoglobin absorbs lower wavelengths such as Blue and Green.
- This is useful for highlighting margins of rashes and dermatitis.



Vascular Mapping

- The structure and position of veins can be emphasized by the device.
- This has many medical benefits and has the potential of offering an uncomplicated alternative to current methods.



Conclusion

- A functioning non-invasive multi-spectral imaging device was successfully constructed
- Images were collected and processed, leading to a clearer understanding of the objects under observation.
- A useful recipe for Phantom Tissue was established.
- With more time and resources, the design has potential to be simplified to a handheld unit.
- This could lead to cheaper medical expenses and quicker results.

Reference: Nave, R., 2005. *hyperphysics*. [Online] Available at: <http://hyperphysics.phy-astr.gsu.edu/hbase/vision/colcon.html>