Spectral Measurement of Human Skin Colour

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Objectives

❑ **To establish a skin spectral database for different ethnic groups, aging and body areas;**

❑ **To develop a method to predict skin spectral using a digital camera;**

❑ **To develop a skin image database covering true information of colour, spectral, texture, gloss, and shape.**

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Why Spectral Reflectance?

❑ **More informative**

❑ **Independent of illumination**

❑ **True colour reproduction**

❑ **Direct connects with skin chromophores**

  - melanin, haemoglobin

Procedures

- ❑ **Lighting measurement**
- ❑ **Image capture for colour chart**
- ❑ **Consent and information**
- ❑ **Spectrophotometer Measurement**
- ❑ **Spectroradiometer Measurement**
- ❑ **Skin image capture by a 2D camera**
- ❑ **Facial image capture by a 3D camera**

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Lighting in the booth

- ❑ Diffuse light
- ❑ D65 simulator

Lighting Measurement

- ❑ TSR (White Diffuser)
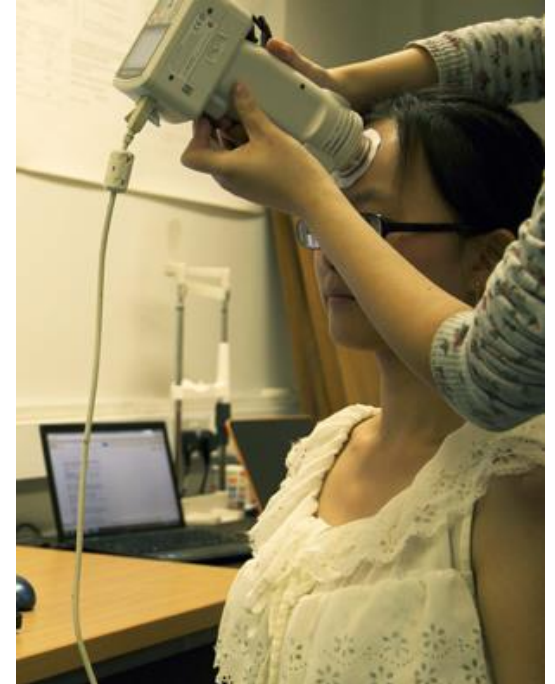- ❑ Digital Camera (white board)

Spectrophotometer

- ❑ 10 body positions
- ❑ 2 measurement sizes
- ❑ Low measurement pressure
- ❑ 3 repetitions

Spectroradiotometer

- ❑ 5 body positions
- ❑ Fixed distance
- ❑ Fixed measurement angle
- ❑ 3 repetitions

Digital SLR Camera

❑ Fixed capture distance
❑ Fixed capture angle

❑ Fixed lens focus
❑ Fixed exposure setting
❑ Fixed ISO setting
❑ Fixed white balance

❑ Save in raw image
❑ 3 repetitions

3D photogrammetry system

❑ Built-in flash lighting
❑ Room Lighting

❑ Fixed capture distance
❑ Fixed capture angle

❑ Fixed lens focus
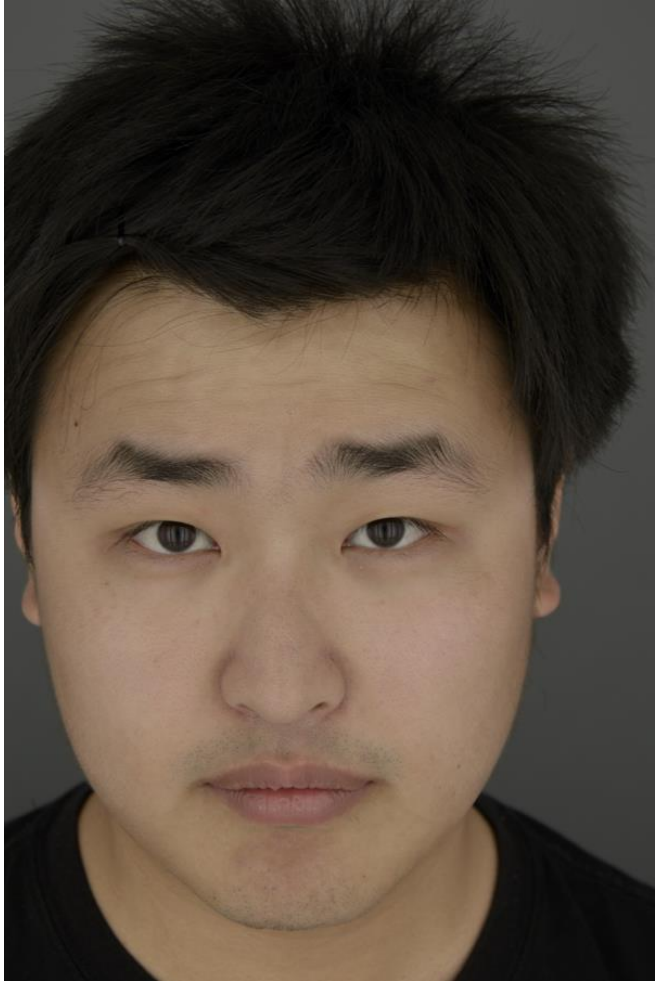❑ Fixed exposure setting

❑ Save in 3D image

3D facial image

Skin Image Capture

2D camera image

3D camera image

Model Development

- ❑ Selection of colour chart
- ❑ Selection of skin colour database
- ❑ Applied Mathematical models
    - camera colour characterisation
    - camera sensitivity function prediction
    - skin reflectance re-construction

Model Evaluation

Proposed skin spectral data

Skin spectral data

Caucasian	Oriental	Sub Asian	African
32	61	4	5

Skin colour chart

Silicone skin colour chart

Skin colour reflectance prediction model

New reflectance reconstruction model

Thanks

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