



Imaging Plant Water Content in 3D Colour



Imaging Fruit for Robotic Harvesting

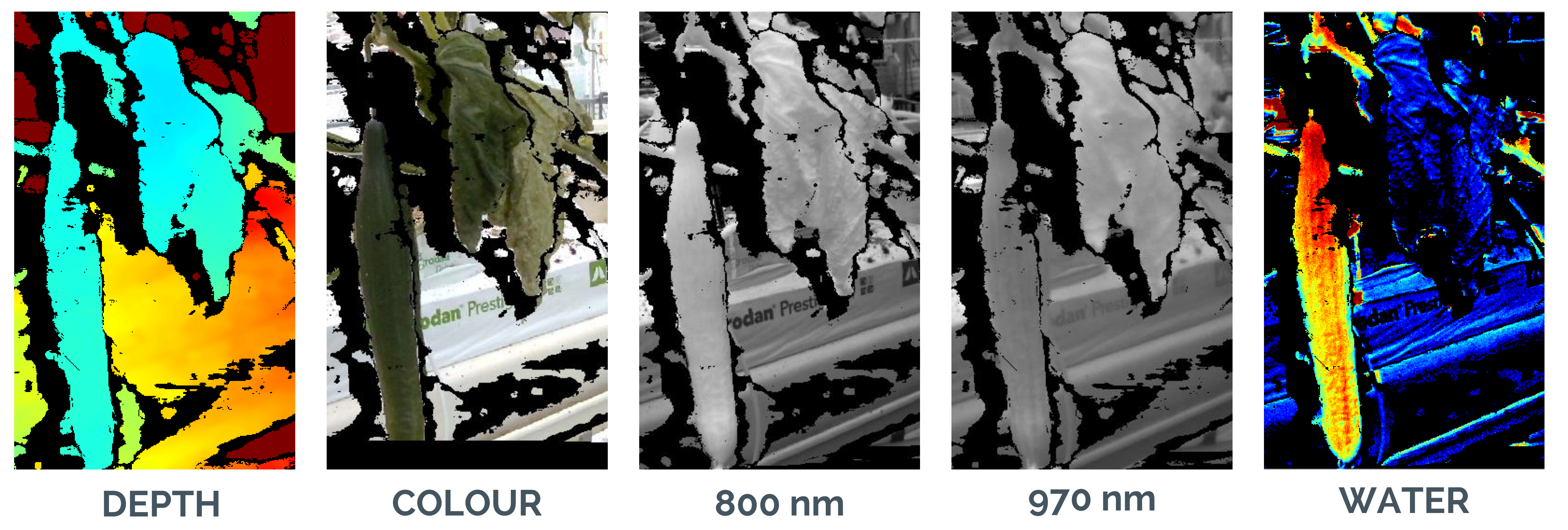
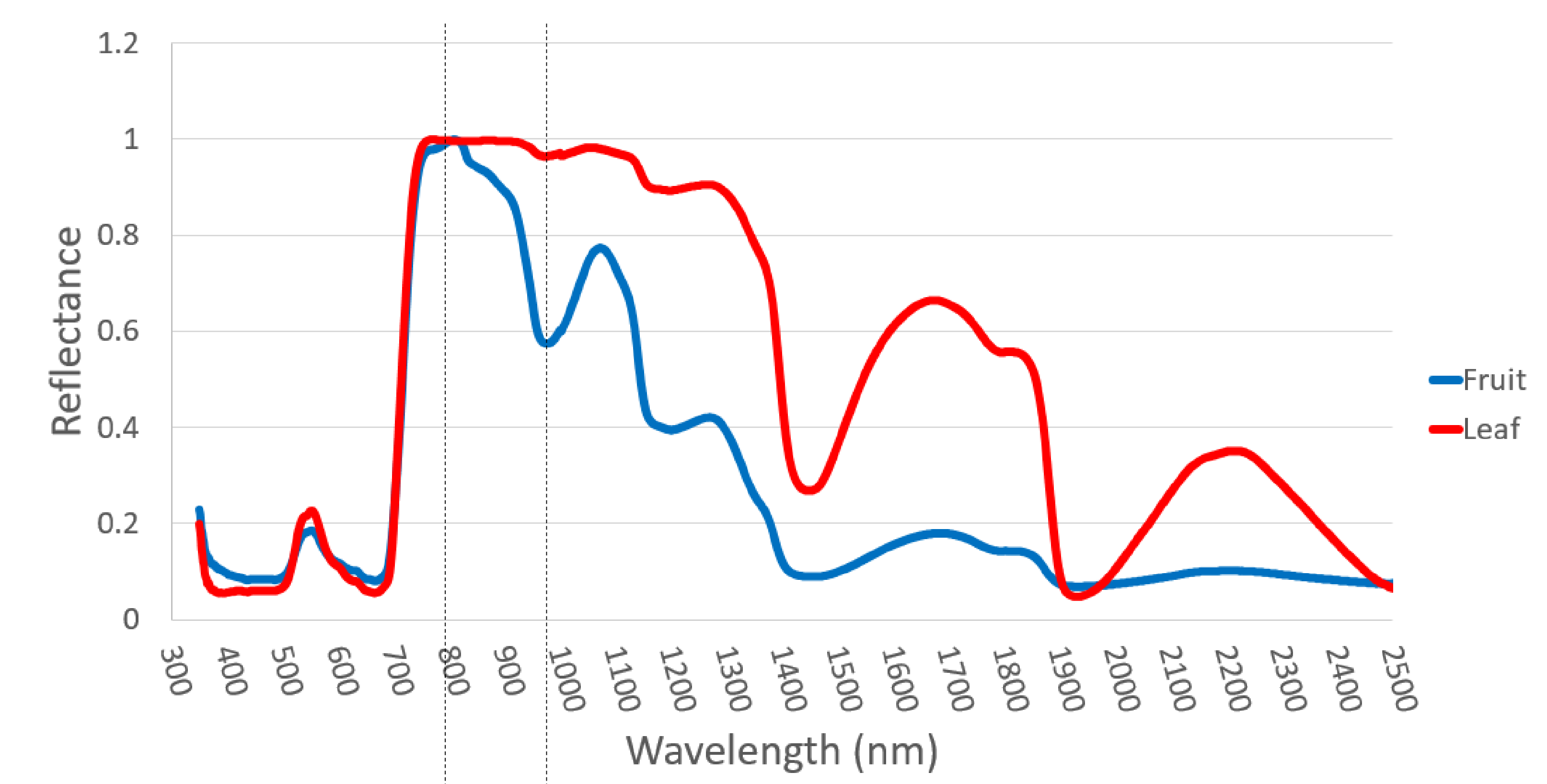
Robotic harvesting requires precise localization of fruit in 3D space so that a robotic arm can reach out to cut and grasp the target. For this, we need depth imaging which can be provided by a stereovision camera (that also provides colour). Water content imaging can be achieved using two infrared cameras: one filtering only light at 800 nm and another at 970 nm.

Aligning and synchronizing the data from each of these channels requires expertise that was only possible through collaboration with l'Institut National d'Optique (INO).

Distinguishing Cucumber Fruit

Brian Lynch

Green fruit can easily be confused with leaves, so how can we distinguish the fruit more easily? Initial studies of the spectral response of fruit and leaves revealed a useful property. The reflectance of infrared light at spectral bands corresponding to water differed significantly between leaves and fruit – much higher water content in fruit compared to leaves.



Combining state-of-the-art deep learning detection algorithms with water content for verification allows for reliable identification of fruit at a high level of performance.

Band ratio between response at 800 nm and 970 nm provides a normalized water content index.

$$\rho = \frac{r_{800} - r_{970}}{r_{800} + r_{970}}$$