mitrefinch

Global experts in Employee Management Solutions

# Mitrefinch and Lumidigm
# A new wave in Biometrics

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# Mitrefinch Biometric Systems

In 2010, Mitrefinch announced the integration of Lumidigm's award winning multi-spectral fingerprint sensors into all Mitrefinch Biometric Time and Attendance and Access Control units.

For Mitrefinch users, Lumidigm's sensors eliminate common real world performance problems that occur when users can't enrol on standard fingerprint devices, which often leads to user frustration, an increase in system costs, lower productivity and can breed resistance to universal biometric technology adoption.

All Mitrefinch biometric terminals are designed and manufactured in-house at the Mitrefinch Manufacturing Plant in the UK, offering maximum flexibility in design and excellent after sales support.

This document provides more information on how the new Lumidigm multi-spectral fingerprint sensors, utilised by Mitrefinch, represent a new wave in Biometrics.

# Why choose Biometrics for Time and Attendance?

## Convenience

Eliminate the need for multiple passwords or swipe cards – with biometric technology a user simply needs to present the feature data, like a finger, to the sensor and access is either granted or denied based on whether the feature data is approved.

Employees can be easily enrolled direct at the terminal rather than having to produce swipe/id cards or issue proximity fobs – which can be particularly time consuming for organisations with lots of casuals.

## Eliminate Fraudulent Clocking

Reduce time and attendance fraud by eliminating 'buddy punching' i.e. where one employee clocks on for another.

## Verify Identity

Can be used for identity verification – ensuring that no one without the proper identity can gain access or entry to controlled areas.

## Enhance Security

In large organisations where thousands of employees use cards to gain access to a building, the security of the building and information can be compromised if someone misplaces their card. A biometric entry system ensures that no cards get into the wrong hands.

# Dispelling some of the Biometric Myths you may have heard

There are many misconceptions related to biometric technology that fuel its criticism. Consequently, we tend to overlook the many benefits that biometrics can offer.

Here we look at some of the most common myths that we have come across:

## Biometrics won't work in less than ideal conditions

Many people believe that biometric fingerprint scanners won't work with dirty, greasy or wet hands, in addition to hot or cold environments – which is largely due to bad experiences they have had in the past with biometric systems.

This is certainly the case with conventional or older biometric technologies as they rely on clear and complete contact between a fingerprint and the sensor (which isn't always possible when you consider real-world, everyday situations).

However, the latest biometric systems utilise Multispectral Imaging – which takes unique fingerprint characteristics from both the surface and subsurface of the skin.

This subsurface information is unaffected by skin damage and other environmental factors (see the "Real World Biometrics" section for more detailed information).

## A biometric system can store my fingerprints and they may be given to the authorities in the event of a crime

When an employee enrols via a Mitrefinch biometric clocking terminal, the system saves a mathematical representation of the fingerprint and then reproduces this as a template.

The template is then checked against those stored by the reader, for a possible match. If one is found, the employee's registration is accepted - otherwise it is rejected.

Contrary to popular belief, this biometric template cannot be reconstructed back to the original fingerprint image and is completely different to the fingerprint information stored, for example, by Police OR Corrective Services

## I've heard that you can make a spoof or fake finger that will circumvent the biometric system

Unfortunately, traditional fingerprint identification and biometric systems can be easily circumvented. These outdated systems capture only the image of the fingerprint ridge surfaces that come into contact with the sensor.

These ridges are easy to imitate using common household products and ingredients. For example, a gummi bear lolly that costs a few cents can make a very accurate fingerprint that will "spoof" a traditional fingerprint imaging device.

On the other hand, multispectral imaging technology can detect living flesh from non-living flesh or other organic or synthetic materials.

Further, since multispectral imaging technology observes the internal structures that conform to and dictate the external fingerprint ridge patterns, internal details can be compared to the surface pattern. The multispectral imaging technology used by Mitrefinch can verify that the "internal fingerprint" matches the external one.

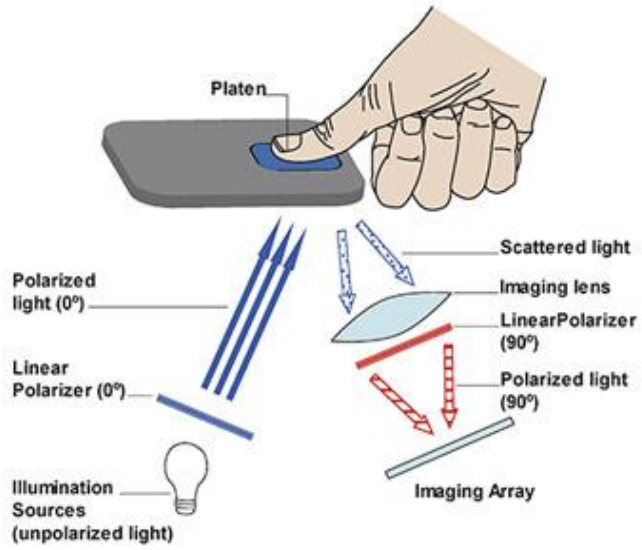
Multispectral imaging technology is hard to fool. The inexpensive and readily-available films and prostheses that easily defeat conventional fingerprint devices are rendered ineffective against this cutting edge technology used in all Mitrefinch biometric systems.


***Spoof Fingers***

## What exactly does Multispectral Imaging Technology mean?

Multispectral imaging looks at and beyond the skin surface to the subsurface foundation of the fingerprint ridges. Different wavelengths of visible light interact with the skin in different ways, enabling significantly enhanced data capture. The fingerprint pattern on the surface echoes the subsurface structures from which they arose during development.

Multispectral imaging exploits the dependent relationship between surface and subsurface fingerprint patterns; subsurface data collected by multispectral imaging technology supports and augments surface data to create the highest-quality fingerprint image available.




The basic operation of the multispectral sensor is straightforward. The sensor consists of two main components: a light source, which provides the light to illuminate the finger resting on a platen; and an imaging system, which images this region of the platen onto a digital imaging array.

While these components are similar to those of a conventional optical fingerprint sensor, the configuration of the multispectral sensor is expressly designed to avoid the optical phenomenon of total internal reflectance (TIR) because it depends on unobstructed and complete contact between the fingerprint sensors and the platen to work.

The multispectral illumination system consists of a source of multiple illumination wavelengths rather than the quasi-monochromatic illumination commonly used for TIR imaging. Linear polarisers are used in the illumination and detection portions of the sensor. The polarisers are arranged in an orthogonal configuration (a.k.a. polariser-analyser) to emphasise the light that penetrates the surface of the skin and undergoes multiple scattering events before emerging from the skin toward the image array.

# Real World Biometrics

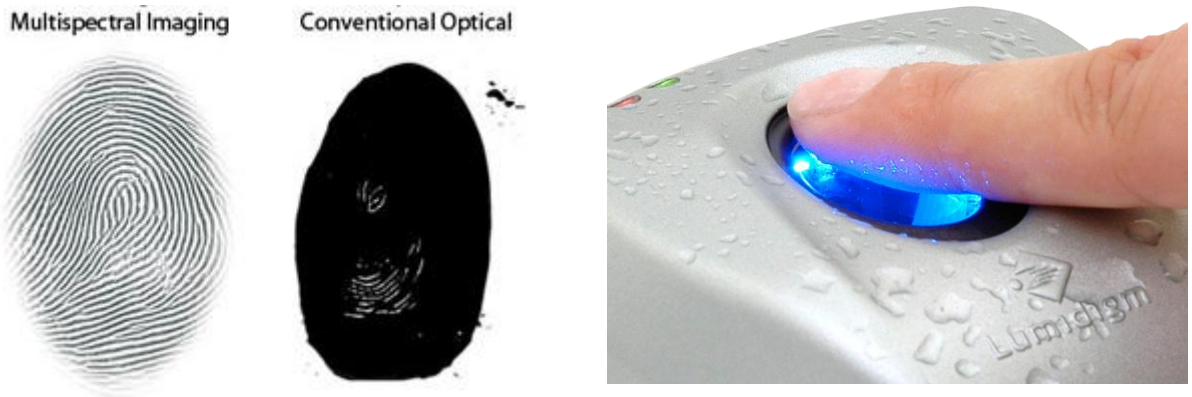
The true test of any biometrics technology is not how it behaves in the lab or how it behaves under ideal conditions, but how it performs in the real world. For many years now, the promise of biometrics has not been fully realised in large part because performance in the lab is not representative of performance in the field.

When biometrics fail, for whatever reason, the technology becomes more of a barrier than an aide. The net result is user frustration, resistance to adoption, and an inability to justify costs. Regardless of which biometric technology is chosen, it must work reliably under real world conditions. The real world is not always ideal. The real world is wet, it is dry, it is not always clean and users are not all young office workers with great skin experienced at using the technology.

## The Real World is Wet

Wet conditions are notoriously difficult for both semiconductor and conventional biometric fingerprint sensors to handle. And yet, moisture is a fairly common real world condition. Some environments are naturally damp, due to climate (London) or setting (a spa). Some people have moist hands. It is typical for people going through security to be nervous — and to have sweaty hands.

Lumidigm multispectral imaging technology, used by Mitrefinch, works in extreme conditions, including rain. Conventional optical technologies are often unable to produce images in wet conditions because excess moisture obscures fingerprint ridges, resulting in images of puddles, not fingerprints. Multispectral fingerprint sensors capture high-quality images in this situation because the direct imaging process does not depend on a clean finger/sensor interface.

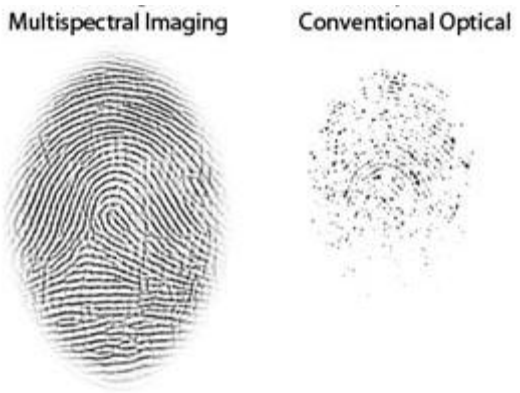



***Wet conditions: two fingerprint technologies produce different results***

## The Real World is Dry

Dry fingertips are common, caused by anything from climate conditions and natural skin characteristics to frequent hand-washing and air travel.

Past attempts to compensate for fingerprint sensors' inability to image dry fingerprints have involved instructions to the user to properly condition their skin ("moist, but not too moist!") before touching the sensor. However, the Lumidigm multispectral imaging technology, utilised by Mitrefinch, captures high-quality images even when fingers are dry.




***Dry conditions: the conventional optical sensor could not capture a complete image because the skin was not moist or pliable enough to establish good contact with the sensor.***

Lumidigm fingerprint sensors do not require perfect contact between the finger and the platen because they use multispectral imaging, a direct imaging technology. Rather than capturing information about the finger/sensor contact and creating an image from that, the Lumidigm sensor effectively takes a snapshot of the fingertip – hence sidestepping the problem of dry fingers.

Another particular advantage of the Lumidigm biometric technology is its ability to capture a fingerprint image through a medical glove.

Ultrasound sensors can also do this, but they are far bulkier and more expensive, which should make Lumidigm sensors appealing to healthcare delivery organisations.

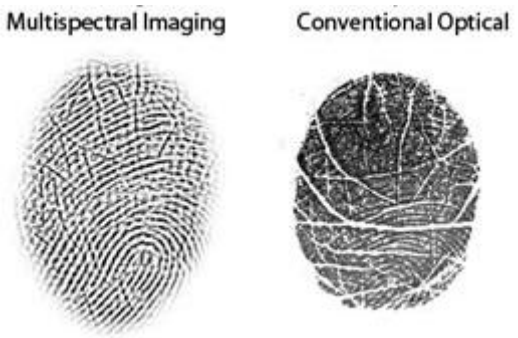
## The Real World is Diverse

The real world is a big place, full of billions of people with unique characteristics. And while the field of biometrics is built on the concept of an individual's uniqueness, a diverse user population can negatively affect biometric system performance if the fingerprint sensor is not robust to the range of user characteristics, both physiological and behavioural.

Lumidigm multispectral imaging technology, utilised by Mitrefinch, is up to the challenge. But what is the challenge? How can a diverse user population affect fingerprint image quality and system performance?

There are several physiological differences that can affect performance. Many people, both young and adult, have small or fine fingerprint features that can be difficult to image. If the sensor cannot differentiate between these fine characteristics, system performance will suffer. Age is another physiological characteristic that can affect the ability of a sensor to collect a usable fingerprint image.

One effect of aging is the loss of collagen in the skin; elderly fingers have soft fingerprint ridges that collapse into each other when the finger touches a surface. Because many sensor technologies depend on the quality of contact between the finger and the sensor to collect a good image, soft fingerprint ridges can be difficult to image.




***Fingerprint images taken from an elderly woman. The Lumidigm sensor was able to collect a usable image.***

Lumidigm technology is relatively immune to these physiological differences because of its ability to collect unique fingerprint information from both the surface and the subsurface of the skin. If surface information is scarce for whatever reason, Lumidigm sensors can still gather enough relevant fingerprint information to produce a usable image.

There are behavioural differences across user populations that can also affect performance. People have different levels of experience with technology and biometrics and this affects how they approach the fingerprint sensor. For example, some people may tend to press hard and others, being more tentative, may barely touch the sensor at all. For technologies that depend on the quality of that touch, this can be a big problem. For a direct imaging system such as the Lumidigm sensor, this is no problem at all!

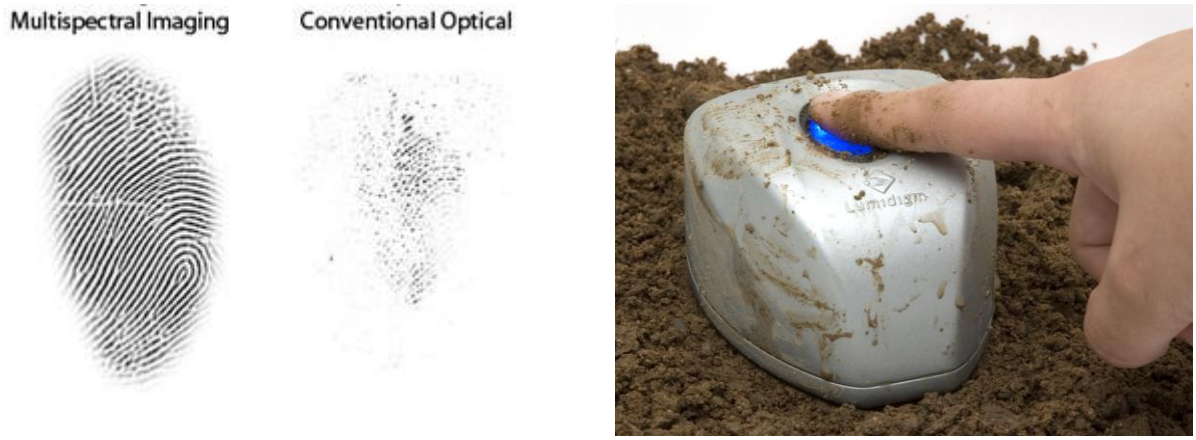
Lumidigm's multispectral imaging technology has been proven in the field with large and diverse user populations. People of all ages and backgrounds use our sensors every day.

## The Real World is Rough

The real world is a rough place, and most of us are showing some wear and tear on our hands. Additionally, people don't have time to wash and lotion their hands when they use a fingerprint sensor, and they resent the inconvenience. Multispectral imaging sensors from Lumidigm take you as you are — at the office, auto shop, or construction site.

A construction site is an interesting real world case. Construction workers work with their hands and have the cuts and calluses to prove it. Additionally, the construction site is dirty so workers may have grime on their hands when they approach a fingerprint sensor.

Altogether, this real world scenario is a nightmare for system administrators whose conventional fingerprint sensors depend on quality contact between the finger and the platen.




***Images of a construction worker's fingerprint, collected with two different sensor technologies***

Lumidigm's multispectral fingerprint sensors work well in situations such as these for two important reasons. First, they are able to gather fingerprint information from beneath the surface of the skin. It is not a problem if the fingerprint ridges on the surface are marred by an injury or a callous because the subsurface information remains intact, and Lumidigm sensors can collect it.

Second, Lumidigm sensors do not require perfect finger/sensor contact. If a user's finger is dirty — an occupational hazard of a construction worker — the debris will prevent good clean contact between the finger and the sensor.

## About Lumidigm

Headquartered in New Mexico, Lumidigm Inc. is a biometric company dedicated to enabling convenient, secure, and reliable identification and verification. Lumidigm provides biometric identity management for civil ID, point-of-sale, time & attendance, physical and logical access, and portable electronic device applications. Lumidigm's technology advantage is protected by numerous United States and International PCT patents and applications.

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Interested in upgrading to Mitrefinch Biometrics?
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