National Applied R&D Centre

MIMOS

FloBo

- **FloBo** is a 5-in-1 device that measures body temperature, pulse rate, blood oxygen level, blood pressure and respiration rate; all at one go.

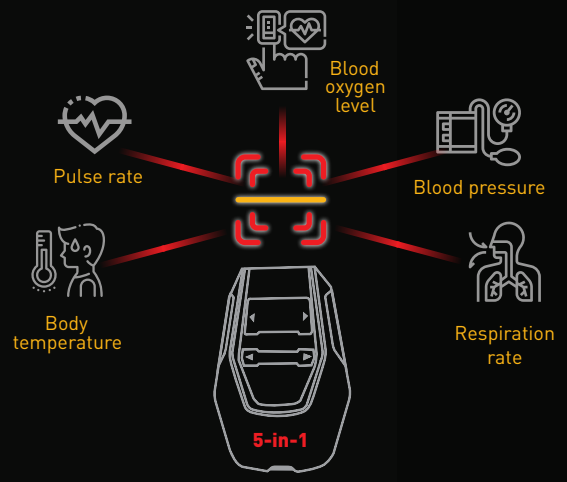
MIMOS in Healthcare

MIMOS is Malaysia's national applied research and development centre that focuses on generating technology solutions that enable the government to provide better services. In the field of healthcare and medical technologies, MIMOS develops need-based, consumer-centric solutions that have supported the consistent and quality delivery of medical and healthcare services.

Ongoing and successful projects include applications for the Ministry of Health; namely the Teleprimary Care - Oral Health Clinical Information System, the Malaysian Health Data Warehouse, Medical Treatment Information System, Patient Registry Information System, and Food Safety System of Malaysia.

Backed by strong capabilities in Artificial Intelligence, Data Analytics and Integration; along with other cutting-edge technologies such as photonics, smart sensors and Internet of Things, MIMOS is committed to driving continuous improvement in healthcare for Malaysia.

FloBo is a single monitoring device that captures multiple vital signs readings. By placing FloBo on the side of the neck, the device can detect five parameters namely pulse rate, oxygen saturation in blood, body temperature, blood pressure and respiration rate, the results of which will be displayed on a smartphone.



VALUE

FloBo is a value-based, patient-centric device that can improve patients' recovery time and reduce adverse events – which in turn can have a distinct impact in holistic healthcare. Packaged as a single device for multi-parameter measurement, FloBo is a cost-beneficial personal healthcare tool with a patient-centric approach, all in a non-invasive, non-intrusive, non-ionised and cuff-less method. As the device's connectivity capability allows it to be integrated with Electronics Medical Records (EMR), healthcare premises will also find FloBo especially convenient.

FEATURES AND BENEFITS

Fully photonic and optical technology

FloBo uses Photoplethysmography (PPG) which utilises near-infrared signal that shines through blood vessels, and bioinformatics approach to perform blood vital signs analysis

Non-invasive, non-intrusive

No cuffs or needles required – just place FloBo's sensor at a single arterial point to obtain readings

Multi-physiological parameters

Provides multiple physiological parameter on single point detection

Internet of Things (IoT)-integrated data capturing

Allows application-specific functions

Bluetooth Low-Energy (BLE)-enabled

Allows integration with external healthcare system

Portable, lightweight and easy to use

Facilitates self-screening and monitoring using mobile app

Fast scanning

Built-in fast scanning algorithm ensures all vital signs readings can be obtained within seconds.

FUTURE PLAN

6 months

January to June 2021

Integration with Ministry of Health's Teleprimary Care - Oral Health Clinical Information System (TPC-OHCIS) for usage at clinics, incorporating MyDigital ID as Single Sign-On service for data protection

9 months

July 2021 to March 2022

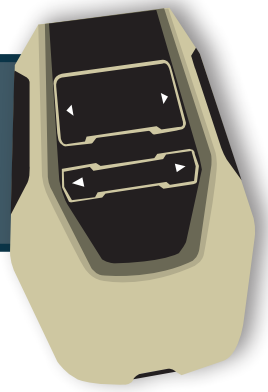
To add Artificial Intelligence (AI)-assisted electrocardiogram (ECG) as one of the parameters for cardiology and heart-related condition

18 months

April 2022 to December 2023

1. To incorporate Secure Integrated Circuit for upgraded security and wide usage in remote areas
2. To integrate with MIMOS Off-Grid Communication (Mi-OGC) for long-distance data transmission.
3. To obtain approval from Medical Device Authority (MDA), Conformitè Europëenne (CE) marking and Food and Drug Administration (FDA) certification.

Caveats: Any potential integration for medical requirement **must seek** Medical Subject Matter Expert & MDA regulation requirement.



TECHNOLOGY

FloBo comprises the following components:

1. BLE- and WiFi-enabled FloBo unit
2. Mobile application
3. Database server (pending HIPAA compliant)
4. Web application server (pending HIPAA compliant)
5. Artificial Intelligence server (pending HIPAA compliant)

Parameter	Range	Accuracy	Reference
SpO2	70 – 100 %	± 2%	ISO 80601-2-61:2017, EN ISO 9919:2005
	50 -69 %	± 3%	ISO 80601-2-61:2017
Pulse rate	30 – 254 bpm	± 2%	ISO 80601-2-61:2017
Body Temperature	32 – 42.2°C	± 0.2°C	EN 12470-5:2003, ASTM E1112:2006
Blood Pressure	40 - 260 mmHg	± 3 bpm	ISO 81060-2:2013, ANSI/AAMI SP10:2002
Respiration	2 -150 breath per minute (bpm)	± 1 bpm	ISO/FDIS 21647:2004 (E), ASTM F1456-01, IEC/CDV 60601-2-55

Parameter	Value
Accuracy (PR, SPO2, Temp)	(± 1.9bpm, ±0.7%, ± 0.25°C)
Dimension (L x H x W) (mm)	(79 x 29 x 48)
Connectivity	Wireless BLE
Optical Sensor	LED + Photodetector integrated
Data Resolution	18 bit

INTELLECTUAL PROPERTY

Firmware Source Code

Algorithm for measurement parameters in writing:

- Flobo 2.0 Industrial Design
- Apparatus of single point, non-invasive multi physiological parameter measurement device

PUBLICATION

Assessment and Analysis of In-House Developed In-Line Pulse Oximetry Technique for SPO2 and Pulse Rate Screening, International Bioengineering Conference BIOENG 2015

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