

OLEA SENSOR NETWORKS



*IoT INTELLIGENT
SENSOR ANALYTICS*



OLEA SENSE™ VITAL SIGN SENSING DESIGN METHODOLOGY USING MATLAB

MATLAB EXPO 2018

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VITAL SIGN SENSING DEVELOPMENT

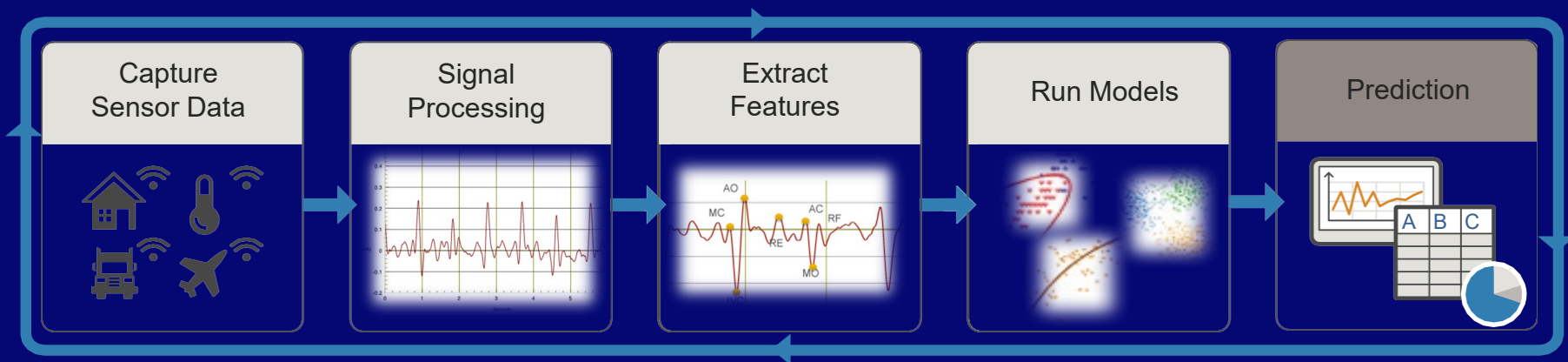
Problem statement:

- ④ The challenge of extracting out features from micro-doppler sensor signals that dynamically determine the presence of life and its vital signs

Approach used to solve problem:

- ④ Incorporated an integrated design flow methodology for hardware, firmware, algorithm and software development.
- ④ Used MATLAB tools as part of the machine learning design flow to develop feature extraction and signal processing algorithms
- ④ Generated code for deployment on an embedded device.

DESIGN FLOW USING MATLAB



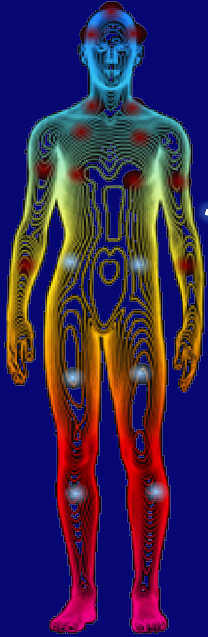
MATLAB Tools Used

- Statistics and Machine Learning Toolbox, Signal Processing Toolbox, DSP System Toolbox, Wavelet Toolbox, MATLAB Compiler, Simulink Control Design & Simulink Design Optimization

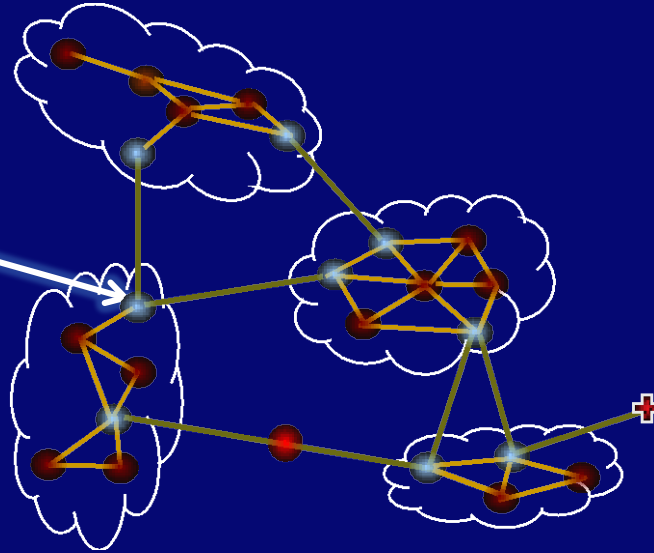
DEVELOPMENT RESULTS USING MATLAB

- ① MATLAB provided a design environment that allowed us to collect, analyze, process and extract features in an iterative way until we achieved and verified the ultimate performance desired.
- ② By incorporating MATLAB in our design flow, we were able to generate advanced machine learning algorithms that enabled our sensor technology to capture medical grade vital sign data.
- ③ Finally this accelerated the deployment of our embedded code in the final product.

INTELLIGENT IOT SENSOR NETWORKS

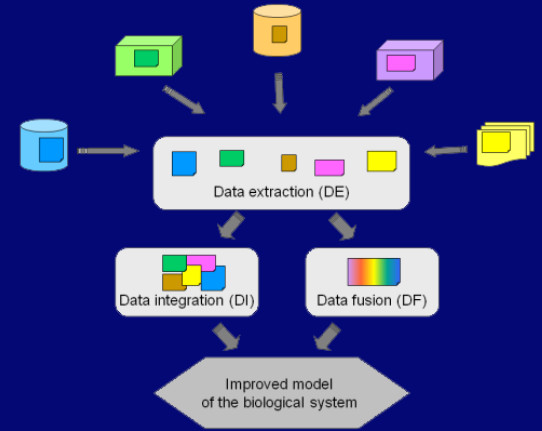


Body Area Network



Intelligent Cluster Topology

Multi-Sensor Data Fusion



Improved Model of the Biological System

REMOTE VITAL SENSING IoT SOLUTION

INTELLIGENT MULTI-SENSOR PLATFORM

Vital Sign
Wearable Sensor
Hub



(84mm x 35mm x 8mm)

Remote health monitoring
applications



Data can be integrated with
cloud-based analytics



Multi-Sensor Hub with OleaSense™ Sensor Analytics

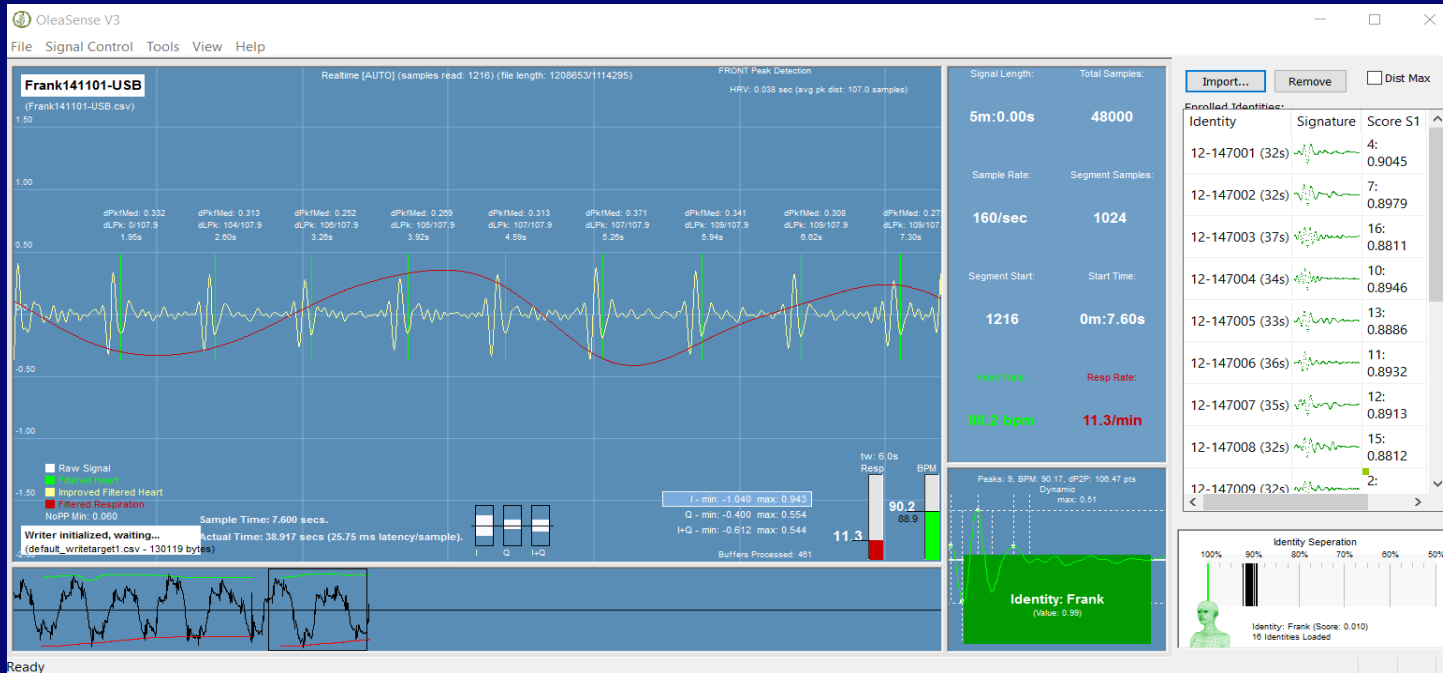
OS-3010 VITAL SIGN SENSOR HUB

- ① On-Board Intelligent Sensors
 - ① OleaVision™ 24 GHz Micro-Doppler Radar Sensor
 - ① Optional Motion & Activity Sensors
 - Tri-Axis Magnetometer (compass)
 - Tri-Axis Accelerometer
 - Tri-Axis Gyroscope
- ① High-performance single-core 1GHz ARM Processor
- ① Connectivity
 - Wired (micro USB 3.0)
 - Bluetooth Low-energy (BLE) 4.0
- ① Rechargeable 1500mAh Li-ION battery



Dimensions—10 cm x 6.5 cm x 2.8 cm
Weight—Approx. 5.0 US ounces (142 grams)

OLEA SENSE AI SOFTWARE

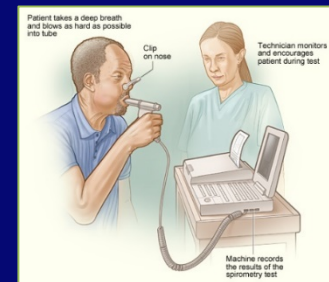
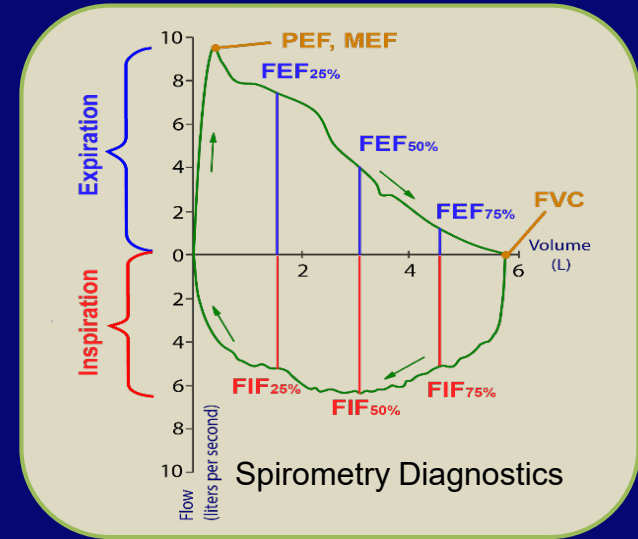


Real-time Vital Data Captured

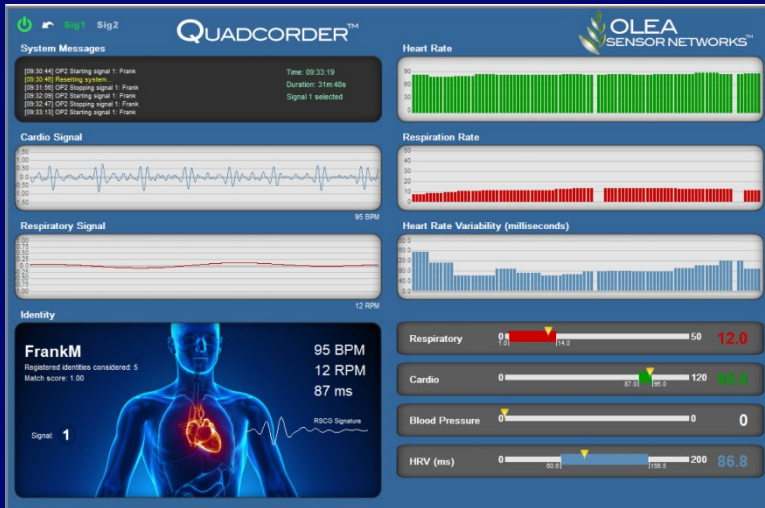
Vital Sign Statistics Extracted by Sensor Analytics.

RESPIRATORY PATTERNS

- ④ OleaSense™ Spirometer
 - A Contactless sensor for measuring the air capacity of the lungs
- ④ Spirometry - meaning the measuring of breath
- ④ Most common of the pulmonary function tests (PFTs)
- ④ Measuring lung function, specifically the amount (volume) and/or speed (flow) of air that can be inhaled and exhaled.
- ④ Future diagnostics in assessing conditions such as asthma, pulmonary fibrosis, cystic fibrosis, and COPD.



QUADCORDER - IoT REMOTE VITAL SENSING



- ❖ Olea's mission is to develop new advanced telemedicine technologies
- ❖ Providing innovations in remote contactless vital sign sensing

THE FUSION OF TECHNOLOGY & MEDICINE

- ❖ Sensor Analytics
- ❖ Enhanced Diagnostics
 - Statistical Analysis
 - Pattern Recognition
 - AI Predictive Algorithms
- ❖ Empowered Patient
- ❖ Knowledge Communities



SUMMARY

Results achieved:

- ① OleaSense medical-grade wireless-contactless sensor successfully acquires vital signs (respiratory & cardiac) in real time
- ① OleaSense was launched in only 6 months due to its design flow methodology which incorporated MATLAB tools
- ① We continue to use MATLAB tools for ongoing enhancements of the algorithms for Machine Learning Diagnostic applications

