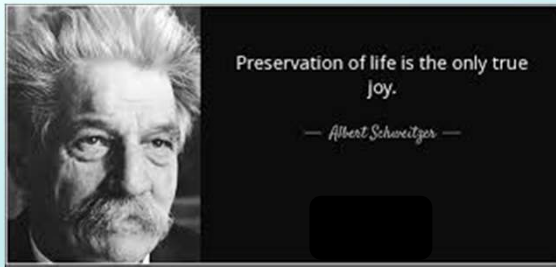


Digital Health *with* Connected Hardware



Research



Care



Emergency Care



Medical Information
Distribution

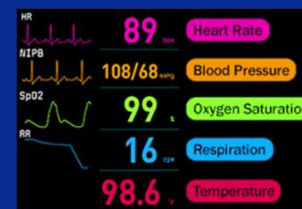


Devices

SENZE HUB



*Predictive
Analytics in
Healthcare*



George Heng

Andrew Schill

Mass Monitoring of Health with Analytics



Confined Facility



Nursing Home



Welfare Home

Community
Integrated
Care



en route to hospital

Central Command Centre

Patient bed 45 ward 32
temperature 38.2 and rising



Healthcare
4 hourly real-time
notifications
of vital signs



age 67 heart rate is erratic
and slow 38-44 per minute

Home monitoring after
(early) hospital
discharge

Senior
alone
@home



Madam Ho @home is
having breathing difficulty





Healthcare
Israel

Moshe Bar
Siman Tov,
Director
General of the
Israel Ministry
of Health
26 Mar 2019

In 2018, Prime Minister Benjamin Netanyahu announced the establishment of a \$300 million initiative for big data utilization, to make this large pool of anonymized data available to researchers, entrepreneurs, and medical institutions.



*Detecting changes
Saving lives*

*Preservation of
elderly lives is
of utmost
importance
– especially
receiving alerts
in their time of
need*

- Advanced sensor technology will help the move towards **home hospitalization**, a trend that is inevitable, given the high cost of treating patients in hospitals.
- In a **home (hospital) setting**, patients are outfitted with wireless capable devices containing sensors that alert staff on changes in a patient's condition. If an anomaly is detected in any of their vital signs, staff are immediately alerted, and the appropriate intervention is— either via remote conferencing, or by dispatching of an emergency team to the patient's residence.

Engineering Innovation with Analytics

Ideation
2018



Development
2019



Adoption
2020



Dad warded
(4 months)
in 4 hospitals



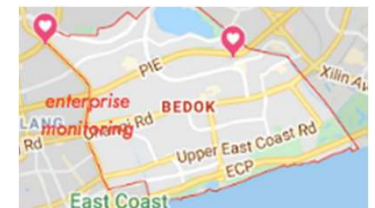
POC & full development
R&D \$190k



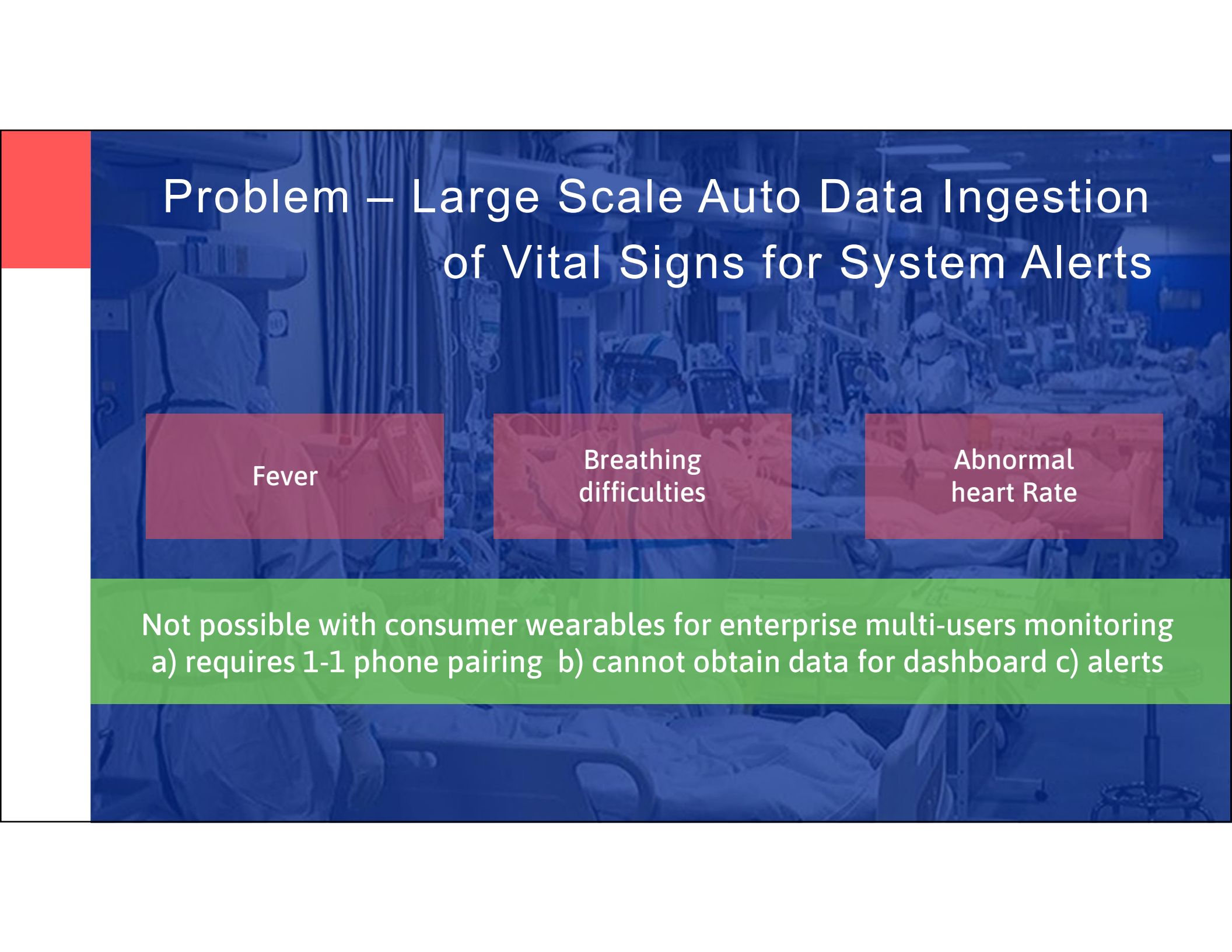
Health 10x
pre-accelerator



Smart Health Leadership Centre
COLLABORATE • DISCOVER • LEARN



Government project
& Nursing homes



Problem – Large Scale Auto Data Ingestion of Vital Signs for System Alerts

Fever

Breathing
difficulties

Abnormal
heart Rate

Not possible with consumer wearables for enterprise multi-users monitoring
a) requires 1-1 phone pairing b) cannot obtain data for dashboard c) alerts

Social Community Impact – regional/global

Detecting changes,
Saving lives

Vital signs early alerts

1. Temperature (fever)
2. Heart Rate
3. SpO² (breathing difficulty)



High Depth

Early alerts for peace of mind
and well-being (our Seniors,
caregivers and SACs/SSCs)

Decrease treatment cost,
faster recovery, longevity

High Breadth

One of fastest aging population

in Asia – 2020	600,000
2030	900,000
2050	3,080,000

Never believe that a few caring
people can't change the world. For,
indeed, that's all who ever have.

– Margaret Mead



Team of 10 (FT/PT)



George Heng
CEO



Andrew Shill
CMO



Ethan Loh
CRO

Advisors



Dr Brian Premchand
Collaborator, I²R
A*STAR



Dr. Mathew Chua
Scientific Advisor



Dr. Ou Yang
Medical Advisor



Research programmes in
Smart Healthcare, AI and
Advanced Robotics.

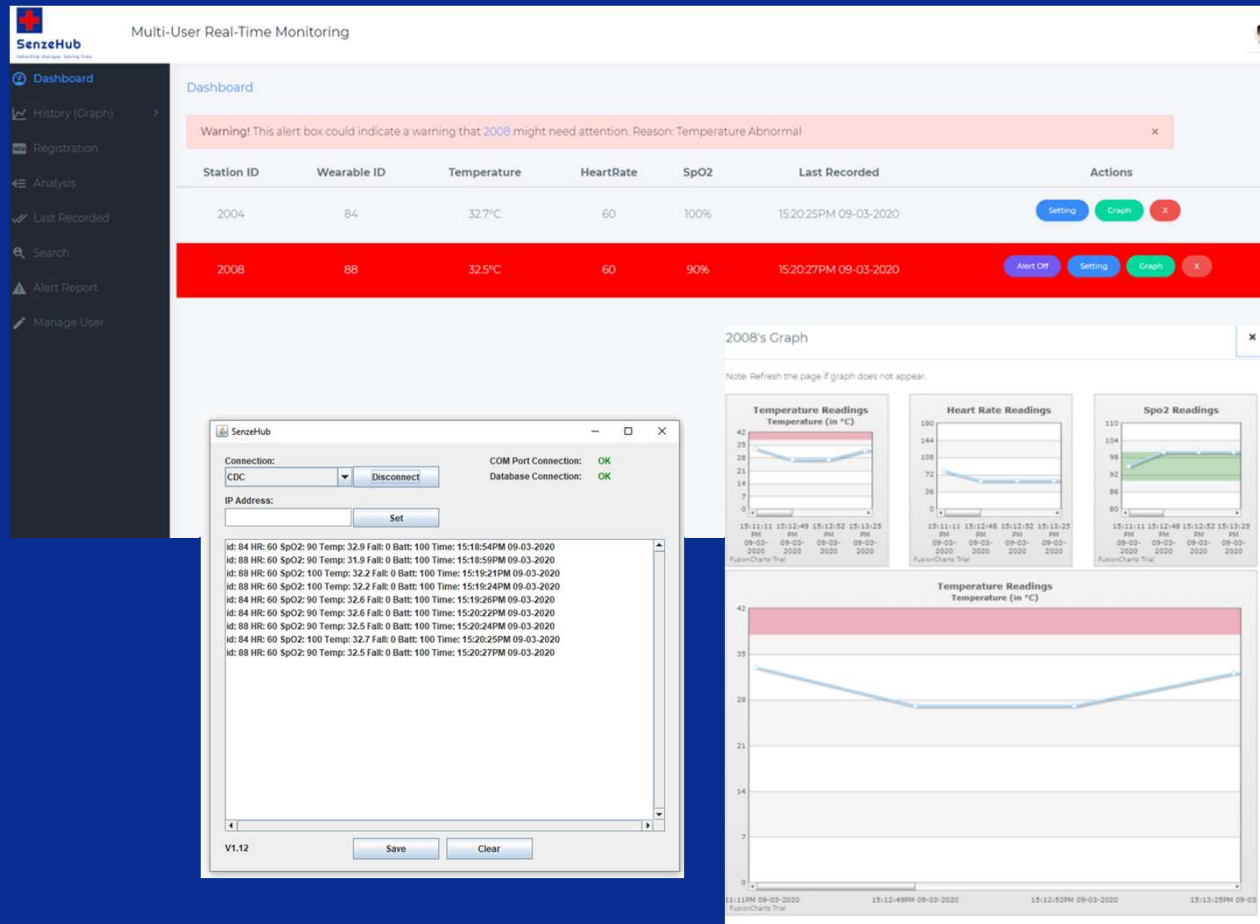


Tech	Winston
Marketing	Coco
Hardware	Daniel

Malaysia	Maegan
	Wai Kun
Sydney	Atul
	Anshul

Electronics review:	
	Colin
	James

Large Scale – Up to 30,000 in a single site



1. Heart rate
2. SpO² oxygen % in blood
3. Temperature

- Location
- Fall alerts

With clinical trials later

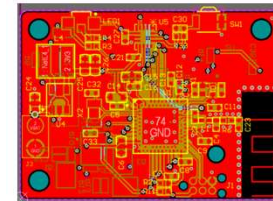
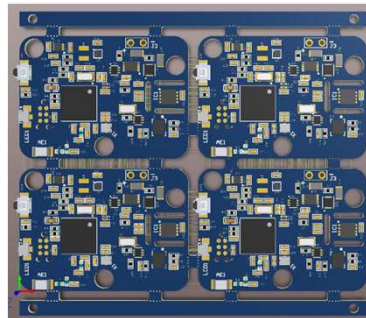
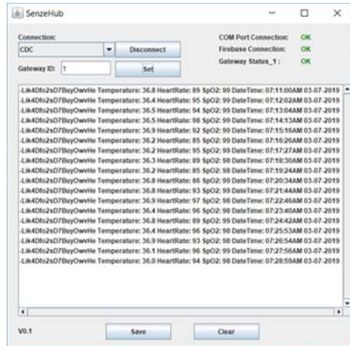
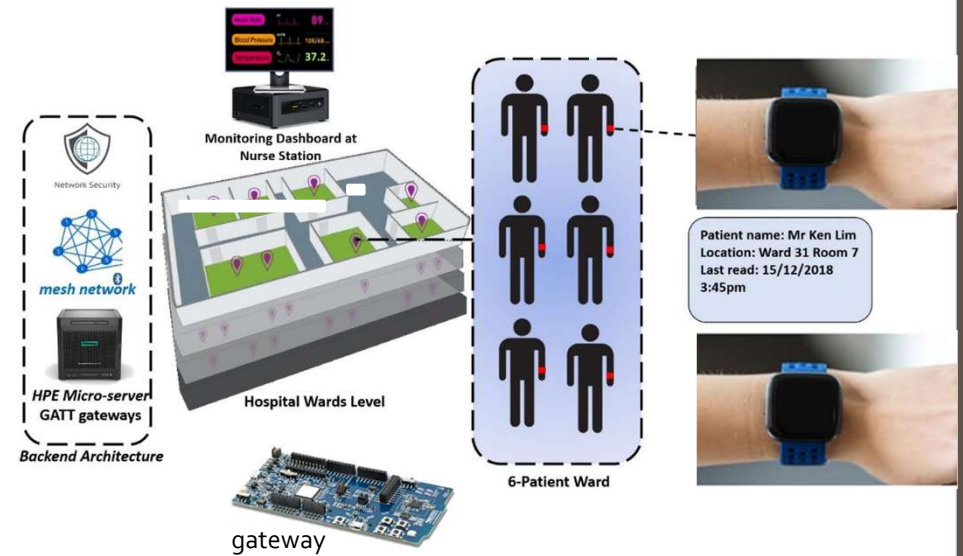
- *Blood pressure – class B*
- *ECG – class B medical*



wrist wearable



large scale multi users up to 30,000 nodes





- government agency - deployed
- nursing homes - deploying
- proposals - welfare home
 - convention centres
 - marine & off-shore



Google Cloud



POC & full development
R&D \$ 190,000

Total to-date \$295,800

3 paid/funded projects
to-date \$ 105,800



20 minutes



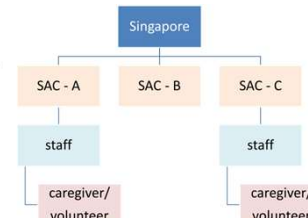
20 minutes



20 minutes



Seniors @home (alone)
with response loop back

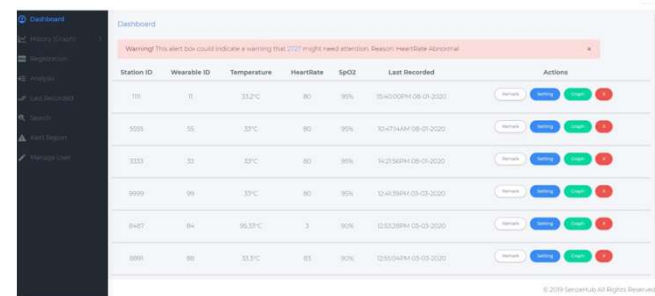


community

Health Monitoring

**SENZE
HUB**
Health for Seniors

Centralised
alerts



Warning! This alert box could indicate a warning that 2557 might need attention. Reason: heartbeat abnormal

Station ID	Wearable ID	Temperature	HeartRate	SpO2	Last Recorded	Actions
111	11	32.2°C	80	98%	15:40:00PM 08-01-2020	Refresh Details Alerts Stop
5555	55	33°C	80	98%	10:47:44AM 08-01-2020	Refresh Details Alerts Stop
3333	33	33°C	80	98%	14:20:58PM 08-01-2020	Refresh Details Alerts Stop
9999	99	33°C	80	98%	12:40:38PM 08-01-2020	Refresh Details Alerts Stop
8487	84	35.33°C	3	90%	12:55:28PM 08-01-2020	Refresh Details Alerts Stop
8888	88	33.3°C	85	90%	12:55:04PM 08-01-2020	Refresh Details Alerts Stop

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**SENZE
HUB**
Enterprise solution



Single users

GARMIN

fitbit

WATCH

Multi-users



Localised
alerts

Digital Health – Early Alerts

R&D \$190,000 + 3 paid/funded projects \$105,800



Confined facility



Nursing home



Seniors @home

project proposal stage



Offshore / Tanker

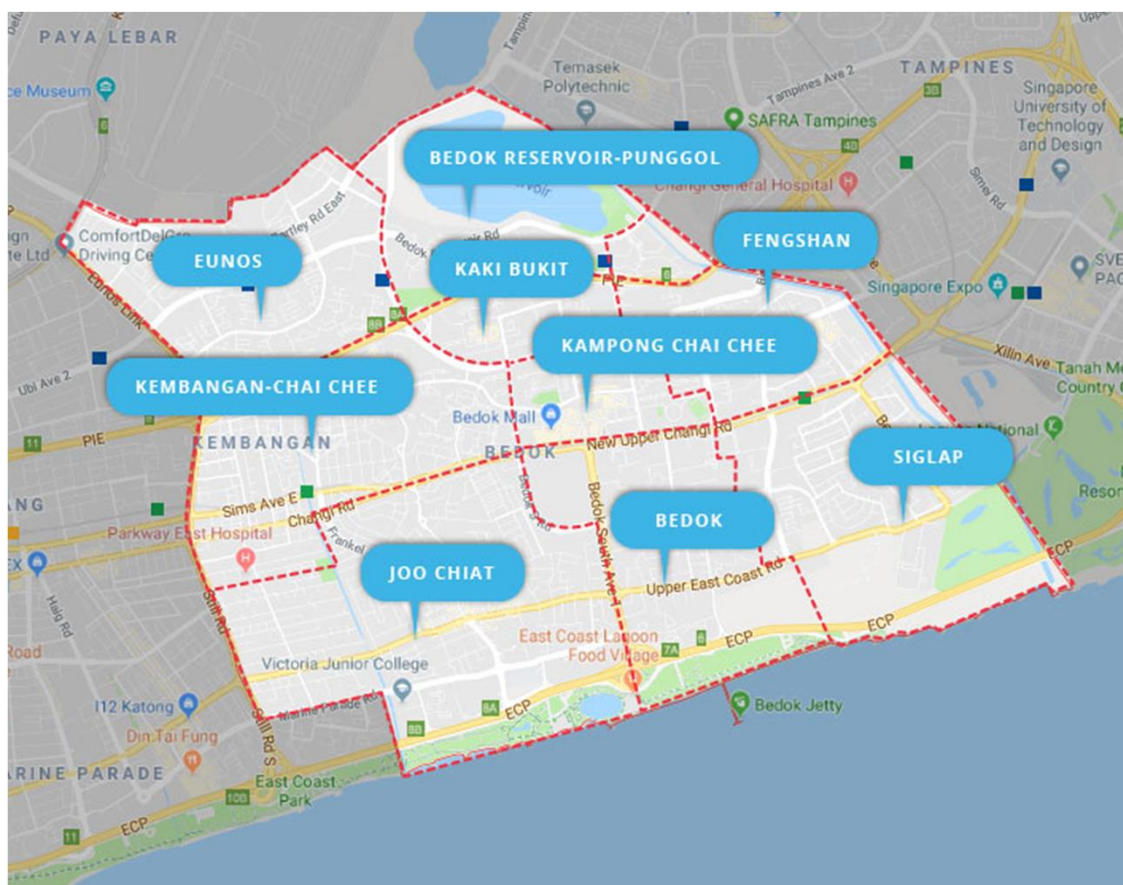


Welfare home



Healthcare

Seniors @home with Community Help



filos

6 November 2021

Seniors @Home with Community Help

[Support for the team Resilience and Growth grant application](#) – We became aware of this solution through MCCY SG Cares and will be piloting early 2021, with details to be worked through in December. The solution as we understand will comprise at least 2 device technologies to assist in areas that Filos is working with frail, isolated and vulnerable Seniors in the community:

- Wearable with periodic [health indicators](#) and [early alerts](#), with dashboard for Social Service Agencies and mobile app used by family members, caregivers, neighbours or volunteers
- Wearable with Bluetooth-Wifi gateway to send readings via [home internet wireless router](#)
- Call help button (portable) device to seek assistance
- Wearable with motion sensor for [fall detection](#)
- Backend to involve others including [volunteers](#) (5 nearest with handphone GPS) for one to respond

Yours sincerely,

Fung Fong

Dr Foo Fung Fong
(MBBS (S'pre), NUS alumni)
Executive Director
Filos Community Services
Filos Volunteer Centre – Bedok (MCCY SG Cares)
38 Chai Chee Ave #01-177 Singapore 461038

[Background](#) - Filos Community Services (FCS) is a not-for-profit social service organization. We focus on building the strengths of the community we live in. FCS was founded in 2004 and set up as Company limited by guarantee on 7 July 2004. On 19 August 2005, Filos was registered as a Charity, and became a member of NCSS on 18 November 2005. FCS is one-stop, home-based, value-added service of health and social care for the elderly living in the Kembangan-Chai Chee Community. Filos' Elderly Services programmes aim to build a community that fosters social inclusion and engagement, allowing older persons of all ages to age-in-place, living their silver and golden years in familiar surroundings.

[SG Cares Volunteer Centre @ Bedok](#), operated by Filos Community Services is one of two pioneer community-based organisations that have been appointed to take on an enhanced role to recruit and develop capabilities of volunteers, curate volunteer opportunities and grow partnerships with stakeholders to meet the diverse needs of Bedok town. Supported by the Ministry for Culture, Community and Youth (MCCY).

Bedok is a matured residential town located in the geographical region of Tanah Merah along the south-eastern coast of the East Region of Singapore. Population wise, Bedok is the largest planning area in the Republic, being home to an estimated 289,000 residents.

– Wikipedia

Business Times - 21 Sep 2020

<https://www.businesstimes.com.sg/life-culture/helping-vulnerable-groups-to-use-tech>

Developing wearables for seniors to track their vital signs and providing early alert.

Andrew Buay VP Singtel added that the focus this year was on two themes: Digital enablement and technologies that empower the vulnerable population such as seniors or persons with disabilities to thrive, and digital solutions that can improve the access and quality of care and can enhance health and well-being.



SenzeHub was set up in 2019 and develops vital signs wearables that flag early warning of condition deterioration, and provides early alert for emergencies.

It was then determined that wearables with biosensors could achieve this. SenzeHub went further by monitoring multi-users in real time without needing to pair with a mobile phone/device.

Research in Digital Health

With large scale health monitoring:

- longitudinal repository of health indicators of individuals through time
- by age groups, male/female, race
- anonymised for medical research

Predictive analytics:

- For healthcare enable the best decisions to be made, allowing for care to be personalized to each individual



Wearable Growth Potential + Aging Population

*Real Time Health Monitoring Devices Market Size Worth USD 110 Billion
With 13.8% CAGR by 2025 with Asia Pacific expected to expand fastest.
September 2019, Trends and insights by Market Research Future*

\$110B

Hospitals, Clinics,
Ambulatory Centres
& Home Care



\$800M

Target serviceable
market : Singapore,
Australia, Hong Kong, Japan
Korea, Malaysia and Indonesia
(with plans for US and Europe)

Revenue Model – \$105,800 from 3 projects



Beachhead:
3 enterprise customers
3 proposals ~ \$150,000



Design + Installation



Maintenance support
(annual recurring)



Singtel
distribution



Device-enabled recurring:

- Services and products
- Healthcare partners
- Research & analytics



Add healthcare partners:

- Readings in their app
- App SDK or cloud API



Digital Health Roadmap



medical research

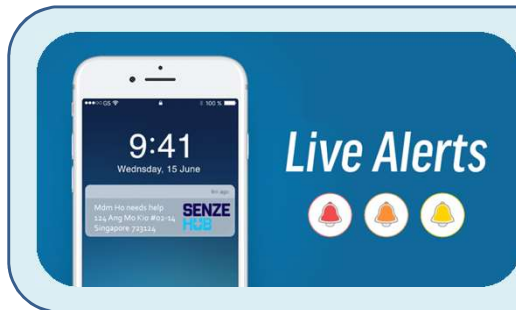


home care

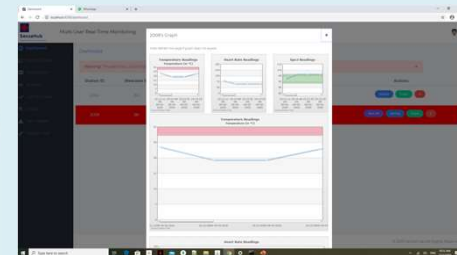


partnering telemedicine

- Location
- Fall alerts



gateway



- Heart Rate
- SpO₂
- Temperature



School of Electrical and Electronic Engineering

prediction of illness



early alerts

partners

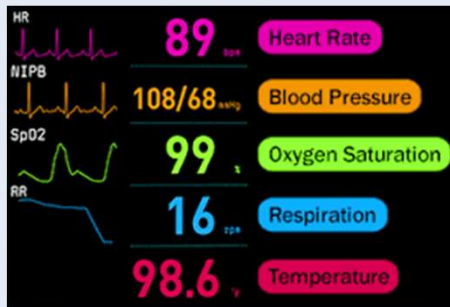


Digital Health *with* Connected Hardware

*Everyone who needs,
will have a wearable*



**ENSURE HEALTHY LIVES
AND PROMOTE WELL-BEING
FOR ALL AT ALL AGES**



George Heng



Gheng@senzehub.com