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# Overcoming healthcare challenges by means of technology - can we prevent future pandemics?

**ZINC 2021 Panel**

27 May 2021 (Thu)

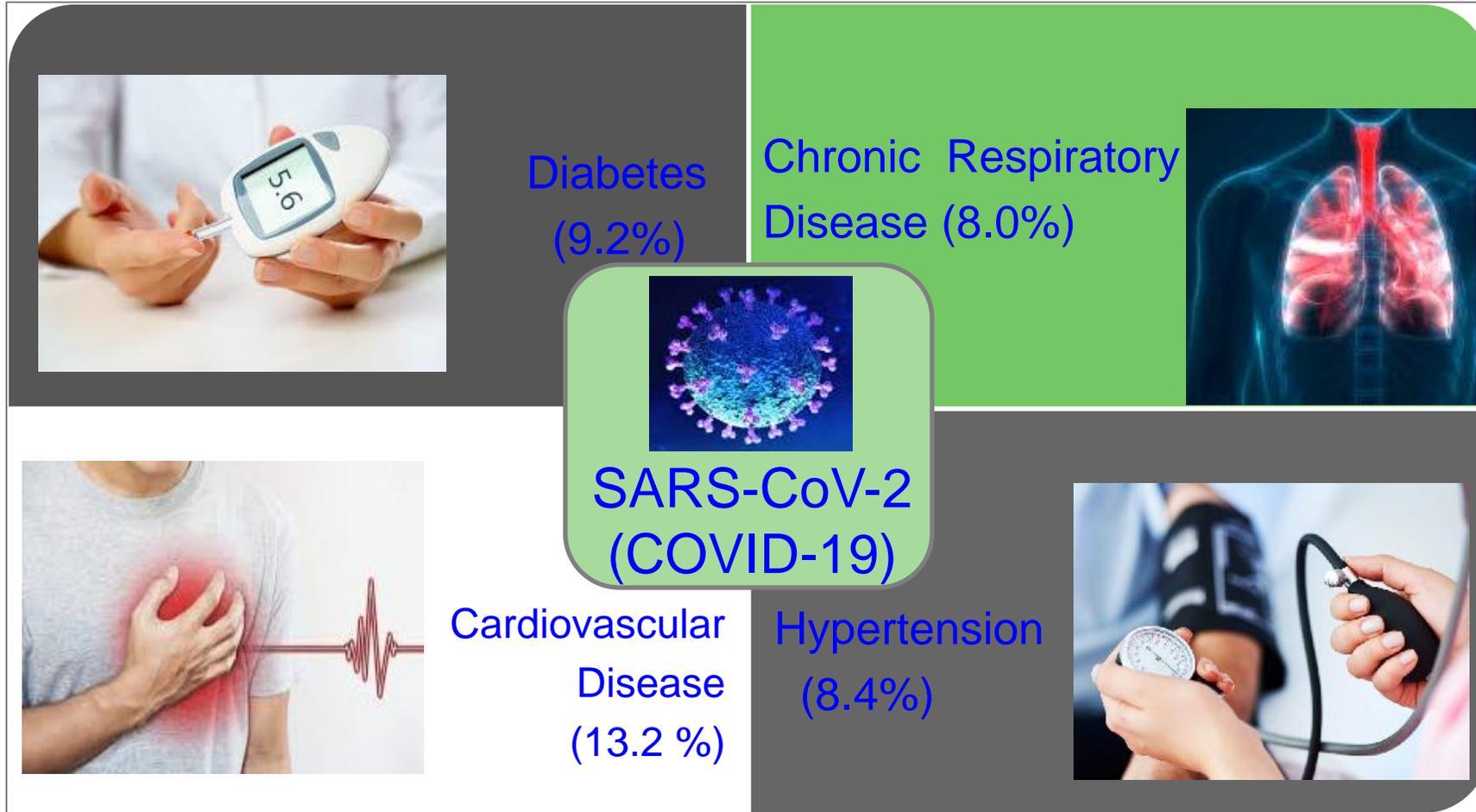
Saraju P. Mohanty

University of North Texas, USA.

**Email:** [smohanty@ieee.org](mailto:smohanty@ieee.org)

**More Info:** <http://www.smohanty.org>

# Comorbidities with Pre-existing medical conditions for COVID-19



Source: A. M. Joshi, U. P. Shukla and S. P. Mohanty, "Smart Healthcare for Diabetes during COVID-19," *IEEE Consumer Electronics Magazine*, Vol. 10, No. 1, January 2021, pp. 66--71.

# Why Stress Needs to be Resolved?

When there is an encounter with sudden **stress**, your brain floods your **body** with chemicals and hormones such as **adrenaline** and **cortisol**.

- Lack of Energy
- Type 2 Diabetes
- Osteoporosis
- Mental cloudiness (brain fog) and memory problems
- A weakened immune system, leading to more vulnerable to infections

Stress is the **body's reaction** to any change that requires an adjustment or response.

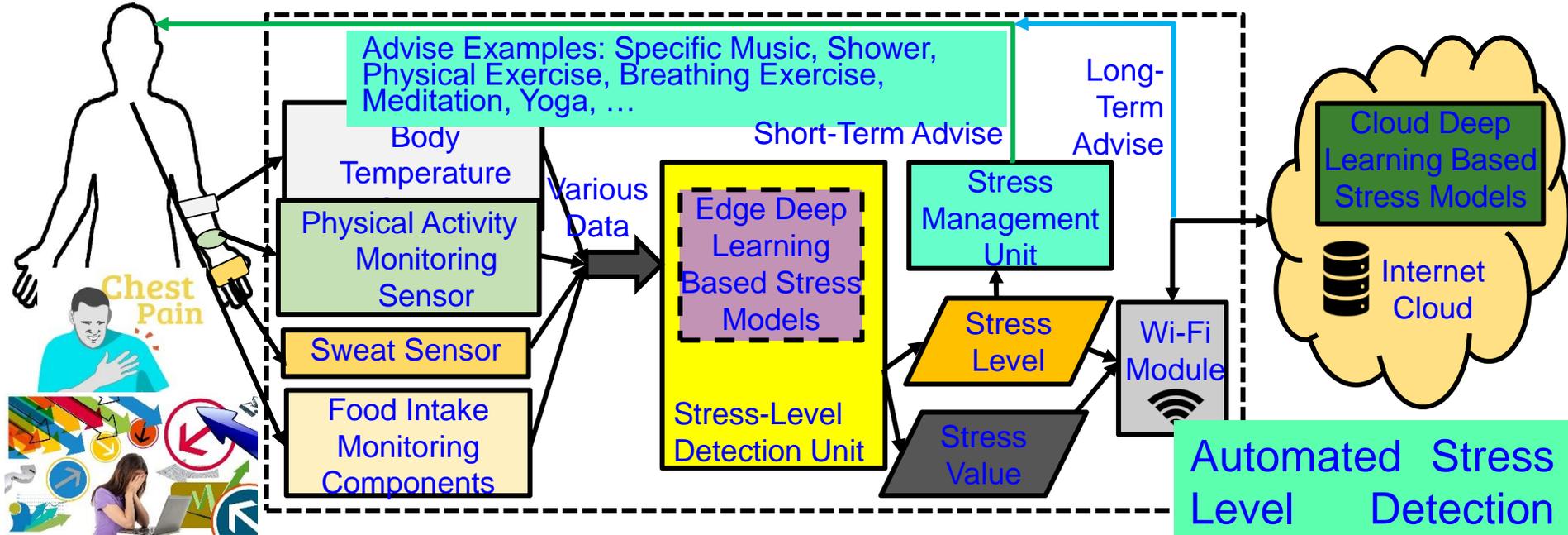


Distress

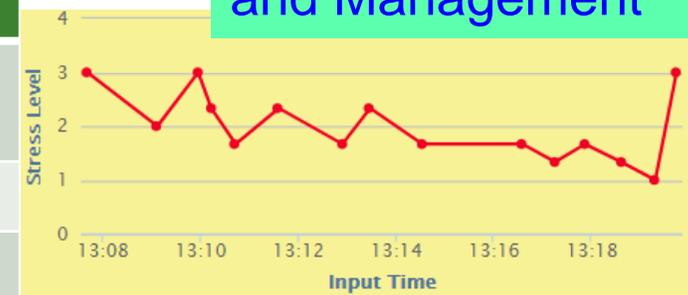


Eustress

# Smart Healthcare - Stress Monitoring & Control



Sensor	Low Stress	Normal Stress	High Stress
Accelerometer (steps/min)	0-75	75-100	101-200
Humidity (RH%)	27-65	66-91	91-120
Temperature °F	98-100	90-97	80-90



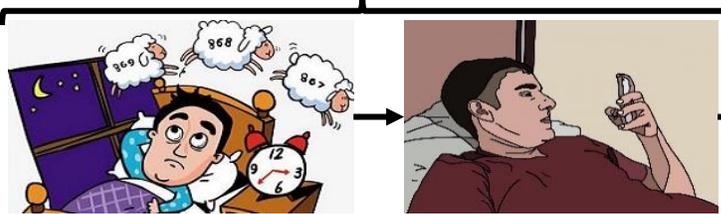
Source: L. Rachakonda, S. P. Mohanty, E. Kougianos, and P. Sundaravadivel, "Stress-Lysis: A DNN-Integrated Edge Device for Stress Level Detection in the IoMT", *IEEE Transactions on Consumer Electronics (TCE)*, Vol 65, No 4, Nov 2019, pp. 474--483.

# Smart-Yoga Pillow (SaYoPillow) - Sleeping Pattern

Person On Pillow:  
Physiological Sensor Data Monitoring Starts



Period 1. Lying on bed but not Sleeping



Person Off Pillow:  
Physiological Sensor Data Monitoring Ends



Period 5: Awake Person



Period 3: Drift from Wakefulness to Sleep



Period 2: Trying to Sleep



Period 4: Deep Sleep

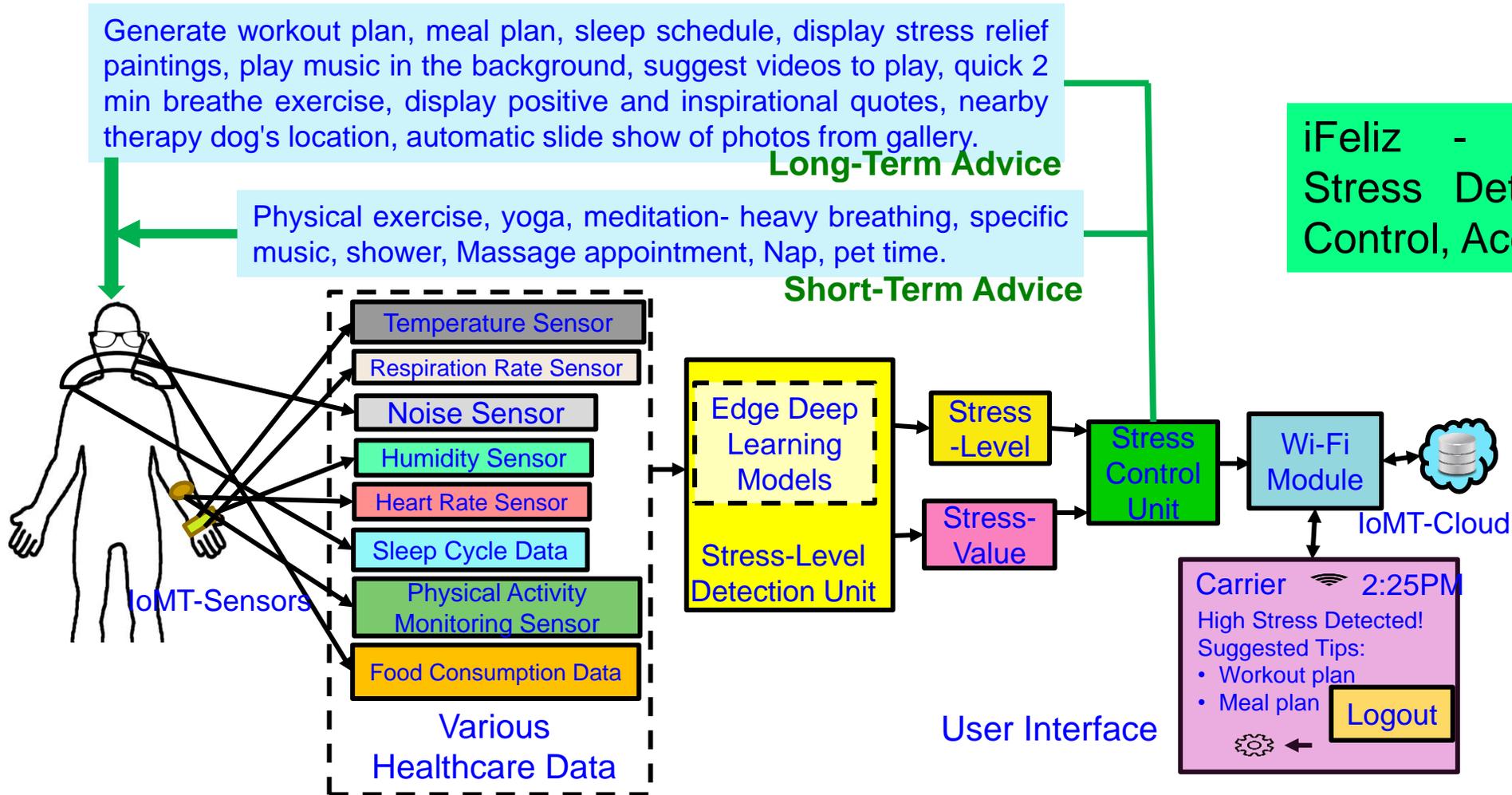


Transitions of a person drifting into non-rapid eye movement (NREM) followed by rapid eye movement (REM) to Awake State.



Source: L. Rachakonda, A. K. Bapatla, S. P. Mohanty, and E. Kougianos, "SaYoPillow: Blockchain-Integrated Privacy-Assured IoMT Framework for Stress Management Considering Sleeping Habits", *IEEE Transactions on Consumer Electronics (TCE)*, Vol. 67, No. 1, Feb 2021, pp. 20-29.

# iFeliz: Proposed System



**iFeliz - 15 Features, Stress Detection, Stress Control, Accuracy - 97%.**

Source: L. Rachakonda, S. P. Mohanty, and E. Kougianos, "iFeliz: An Approach to Control Stress in the Midst of the Global Pandemic and Beyond for Smart Cities using the IoMT", in *Proc. of IEEE Smart Cities Conference (ISC2)*, 2020.

# Virtual Reality in Healthcare



Source: <http://medicalfuturist.com/5-ways-medical-vr-is-changing-healthcare/>

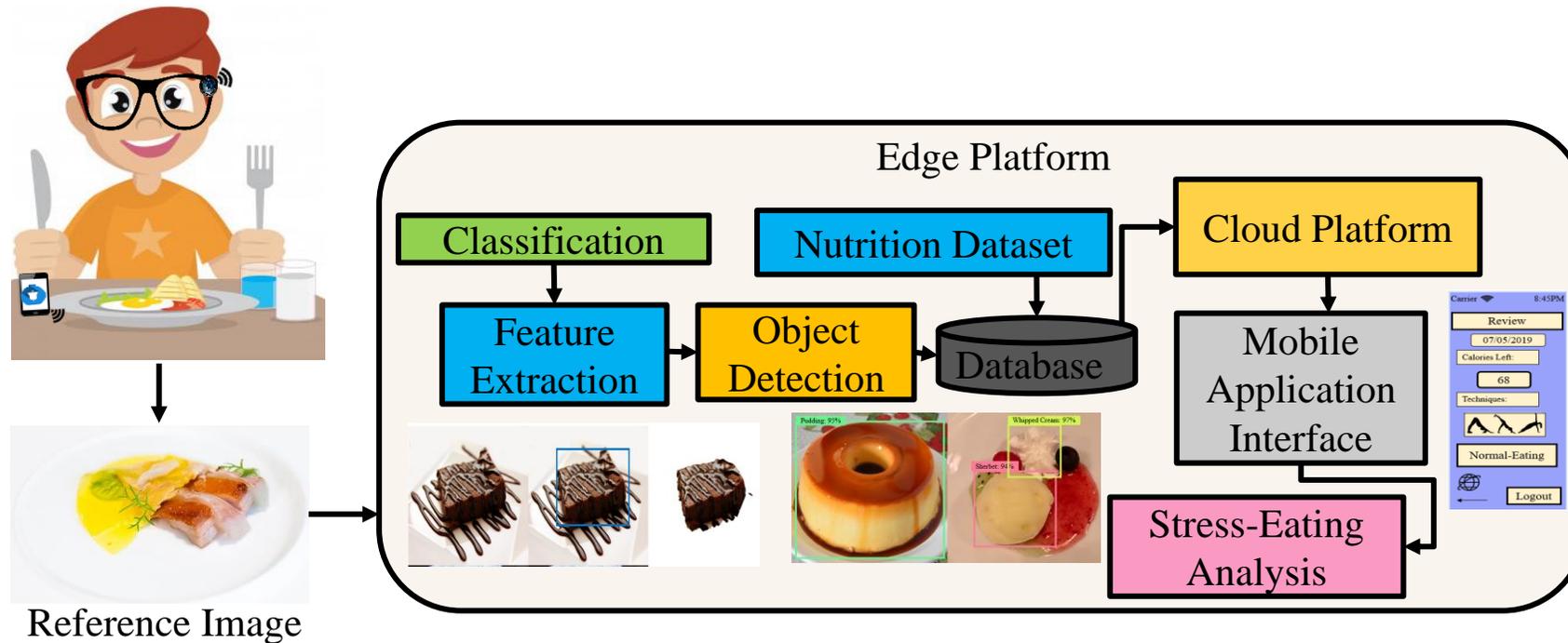
For Therapy



Source: <https://touchstoneresearch.com/tag/applied-vr/>

In Surgery

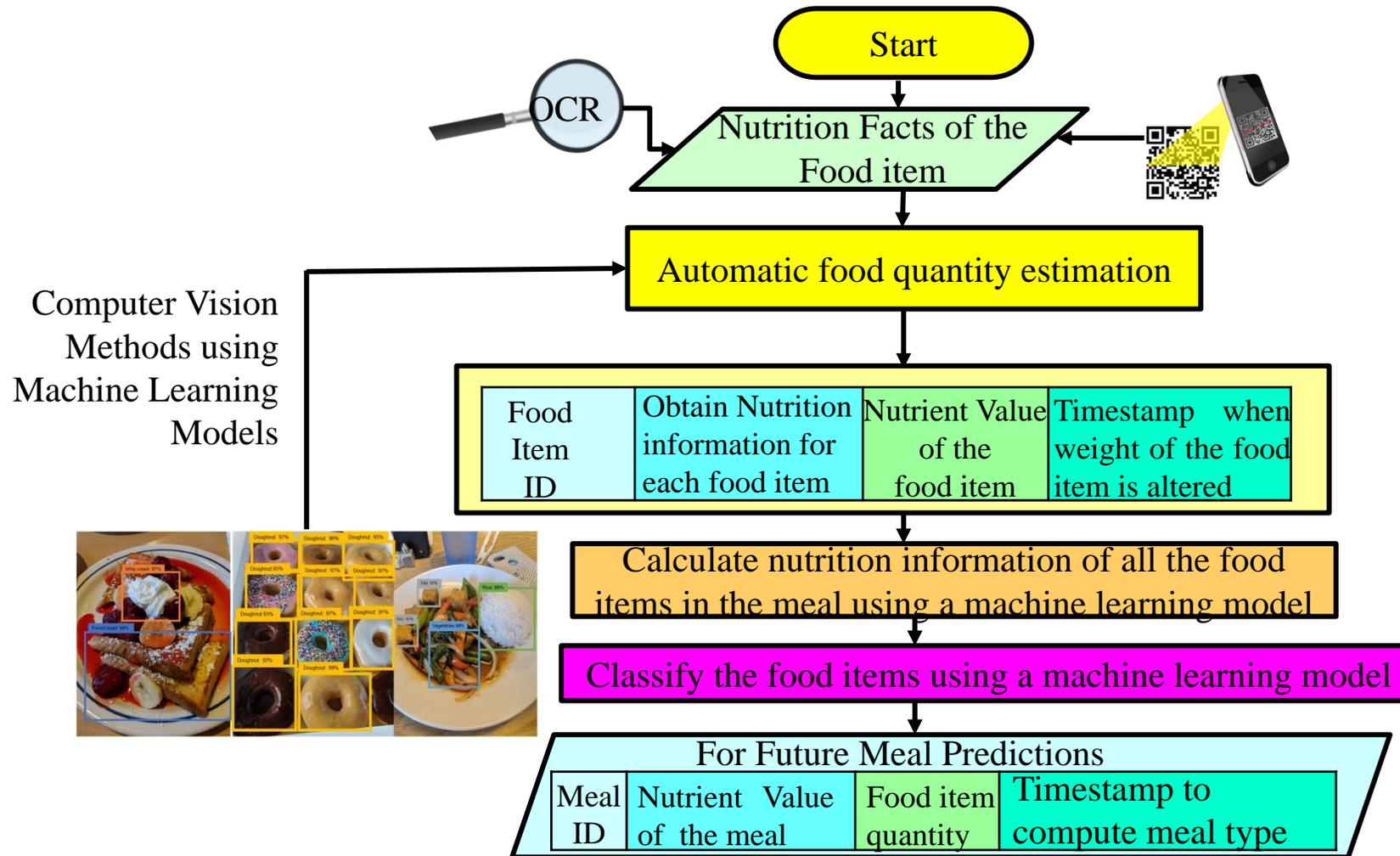
# Smart Healthcare – Diet Monitoring - iLog



iLog- Fully Automated Detection System with 98% accuracy.

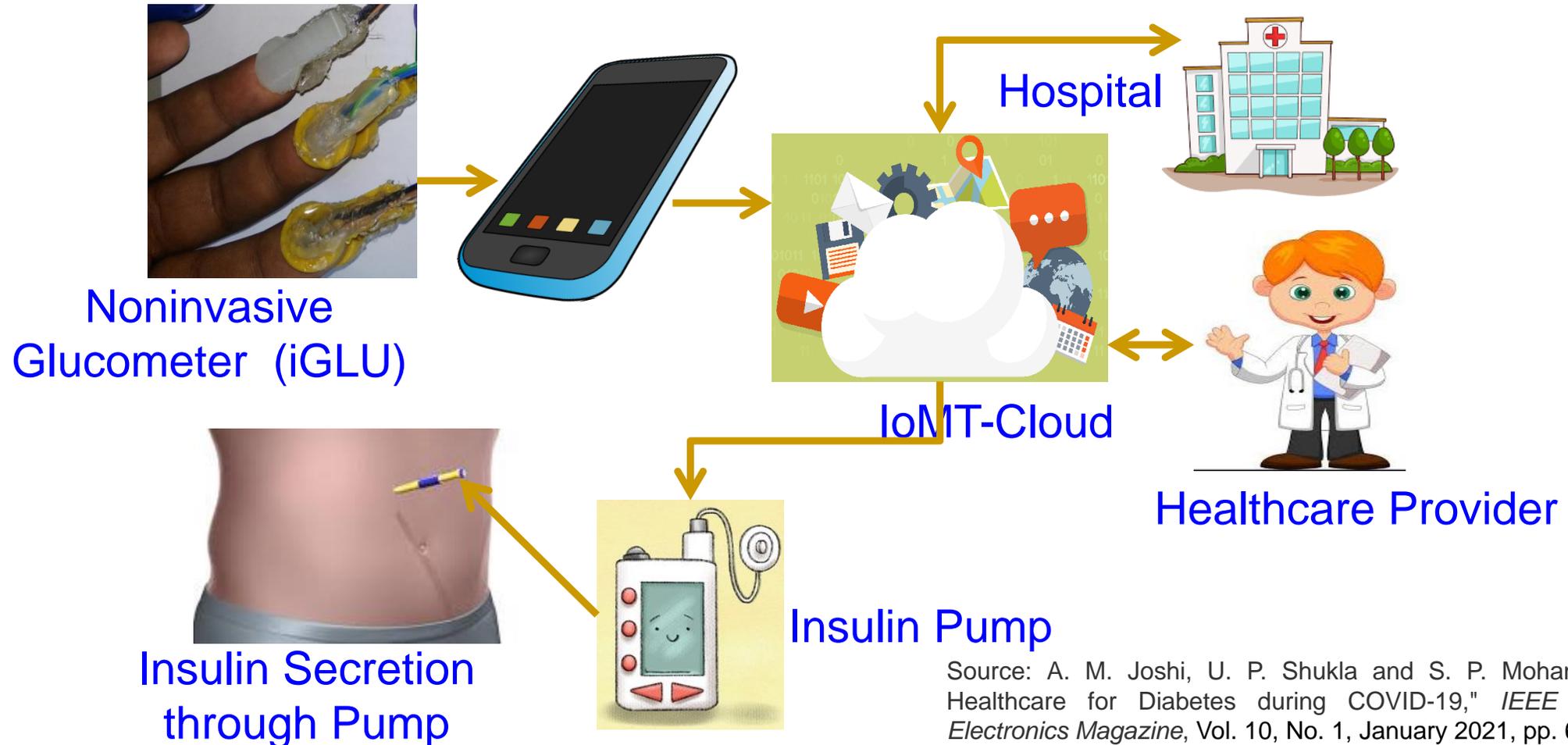
Source: L. Rachakonda, S. P. Mohanty, and E. Kougianos, "iLog: An Intelligent Device for Automatic Food Intake Monitoring and Stress Detection in the IoMT", *IEEE Transactions on Consumer Electronics (TCE)*, Vol. 66, No. 2, May 2020, pp. 115--124.

# Smart Healthcare – Diet Prediction



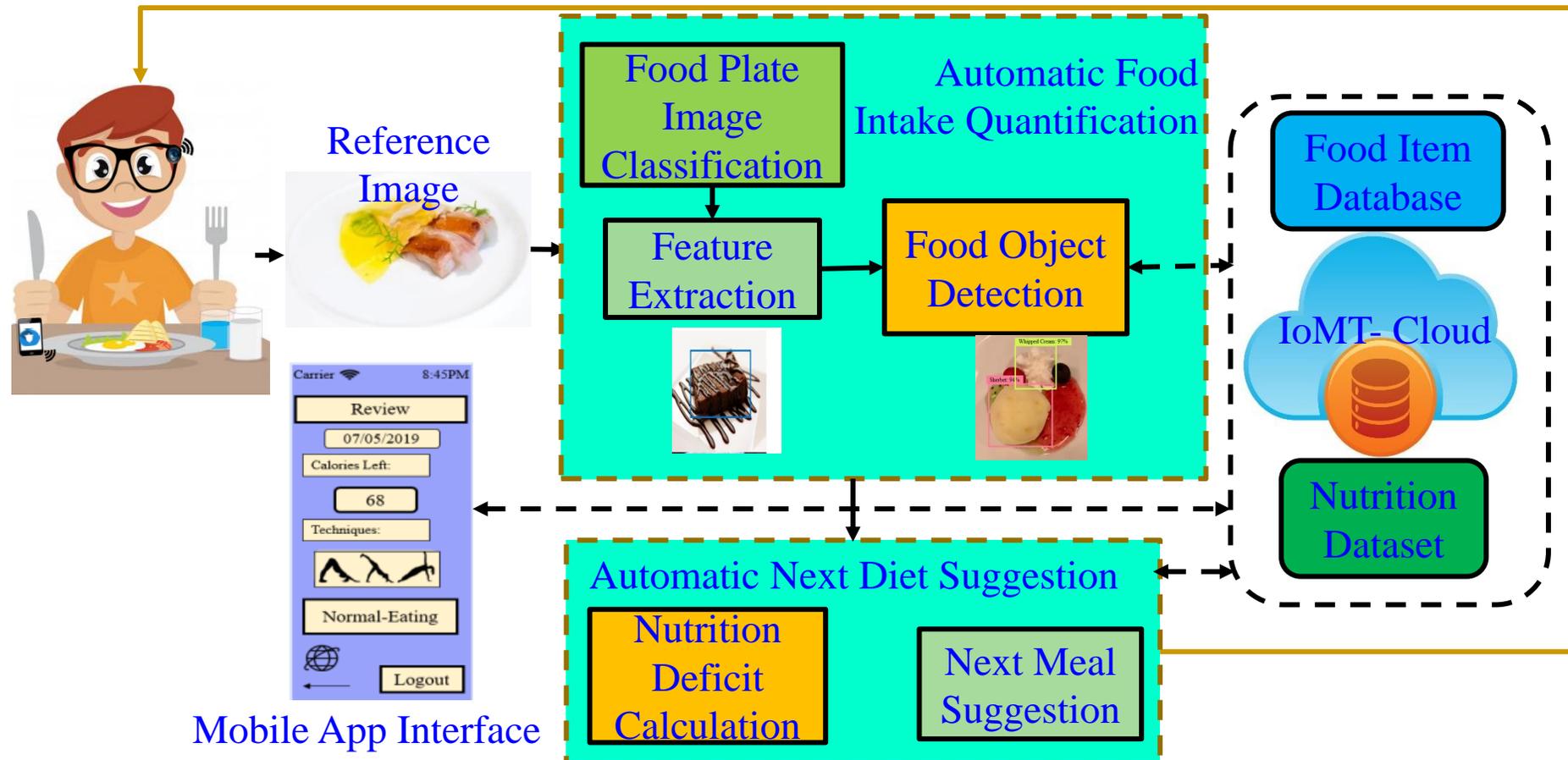
Source: P. Sundaravadivel, K. Kesavan, L. Kesavan, **S. P. Mohanty**, and E. Kougianos, "Smart-Log: A Deep-Learning based Automated Nutrition Monitoring System in the IoT", *IEEE Transactions on Consumer Electronics*, Vol 64, Issue 3, Aug 2018, pp. 390-398.

# iGLU - Our Intelligent Non-Invasive Glucose Monitoring with Insulin Control Device



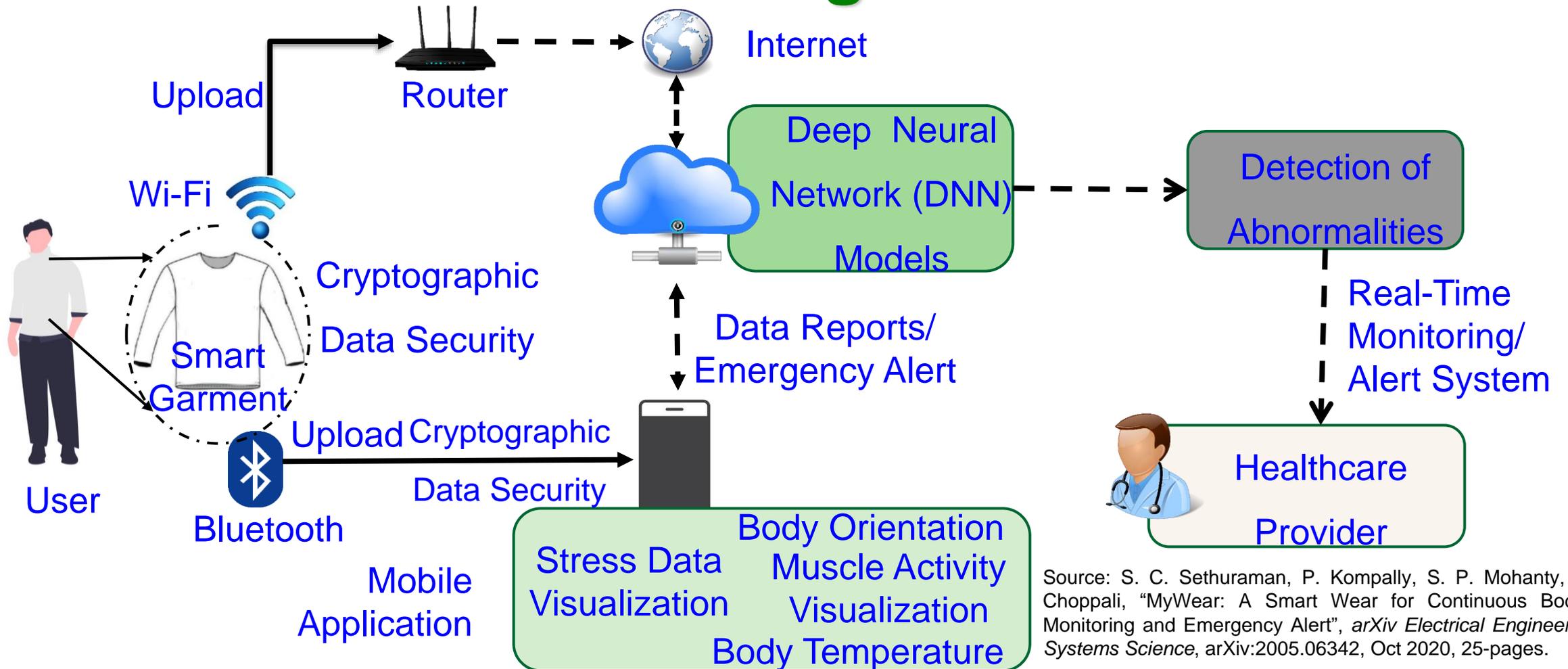
Source: A. M. Joshi, U. P. Shukla and S. P. Mohanty, "Smart Healthcare for Diabetes during COVID-19," *IEEE Consumer Electronics Magazine*, Vol. 10, No. 1, January 2021, pp. 66--71.

# iLog - Our Diet Automatic Monitoring and Control for Blood Glucose Level



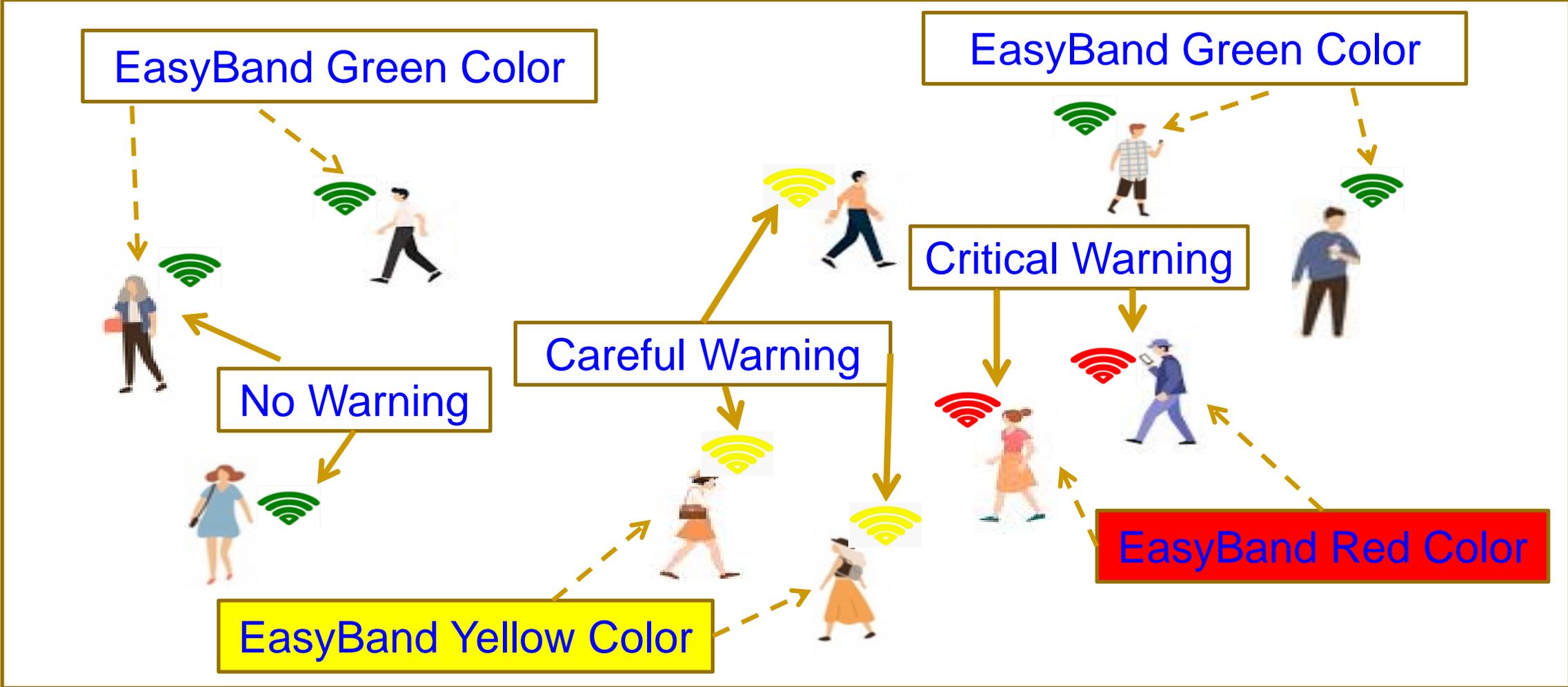
Source: A. M. Joshi, U. P. Shukla and S. P. Mohanty, "Smart Healthcare for Diabetes during COVID-19," *IEEE Consumer Electronics Magazine*, Vol. 10, No. 1, January 2021, pp. 66--71.

# MyWear – A Smart Wear for Continuous Body Vital Monitoring - ECG based



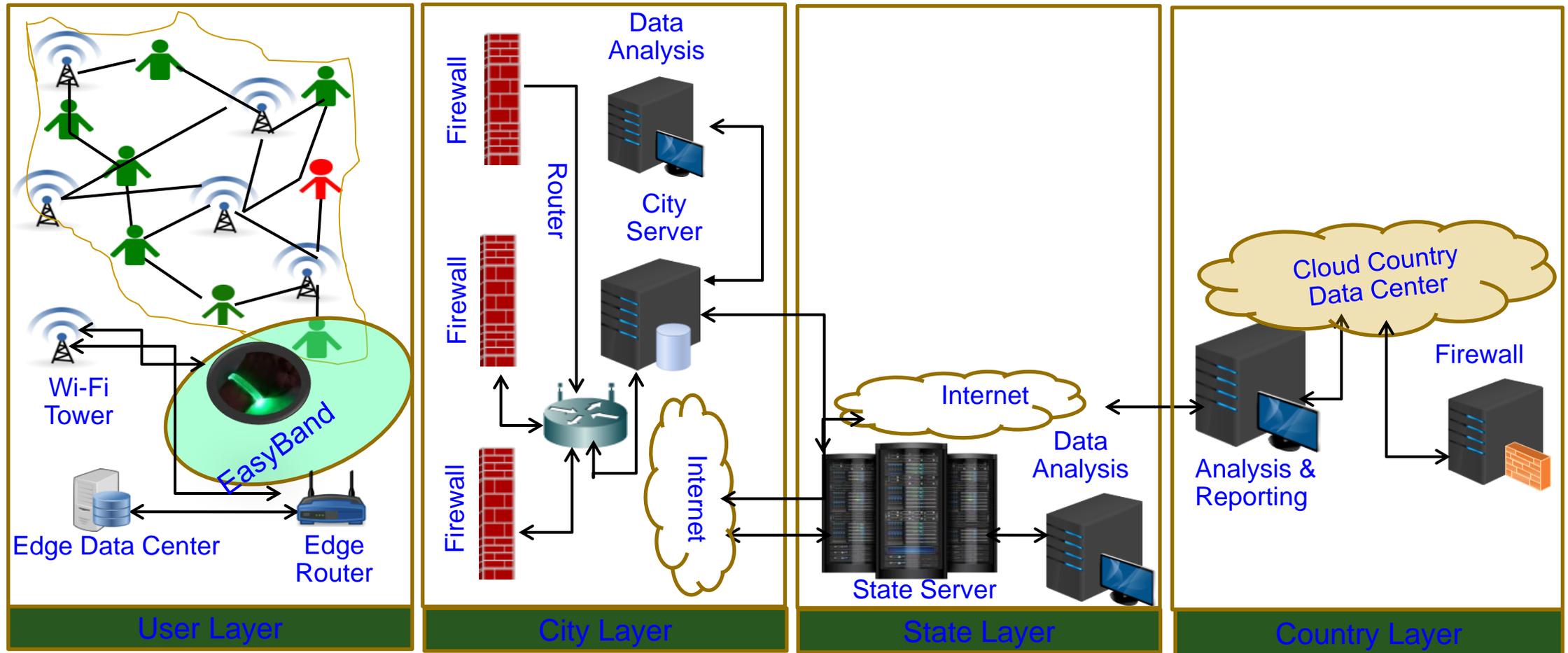
Source: S. C. Sethuraman, P. Kompally, S. P. Mohanty, and U. Choppali, "MyWear: A Smart Wear for Continuous Body Vital Monitoring and Emergency Alert", *arXiv Electrical Engineering and Systems Science*, arXiv:2005.06342, Oct 2020, 25-pages.

# EasyBand – Safety-Aware Mobility during Pandemic



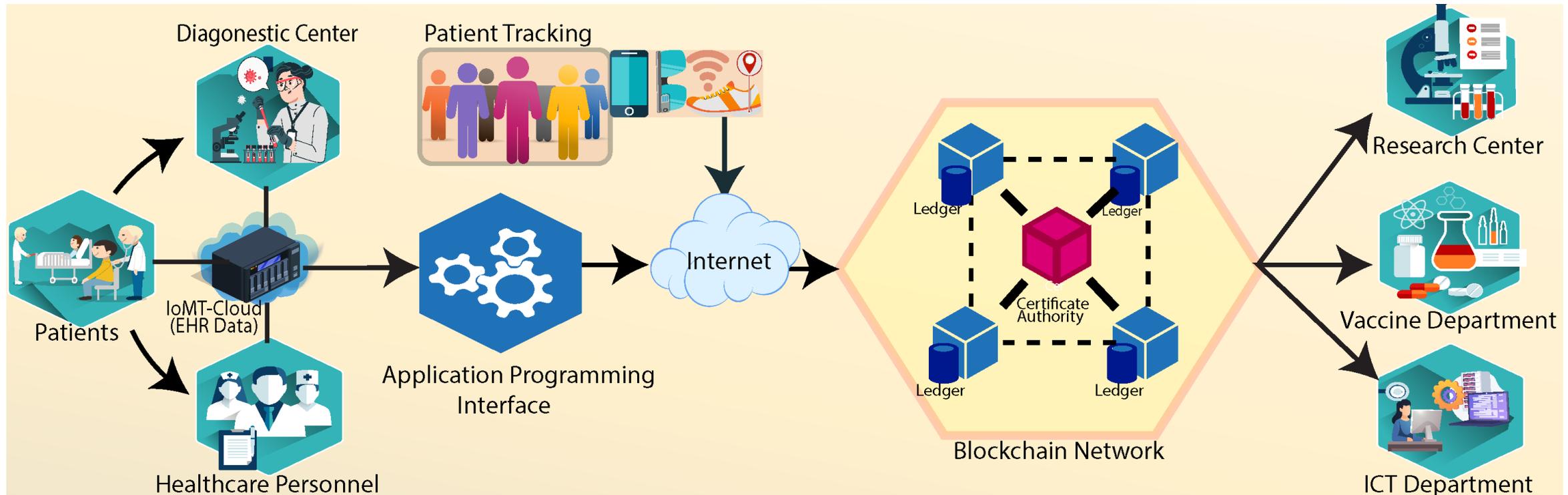
Source: A. M. Joshi, U. P. Shukla and S. P. Mohanty, "Smart Healthcare for Diabetes during COVID-19," *IEEE Consumer Electronics Magazine*, Vol. 10, No. 1, January 2021, pp. 66--71.

# EasyBand in Healthcare CPS (H-CPS)



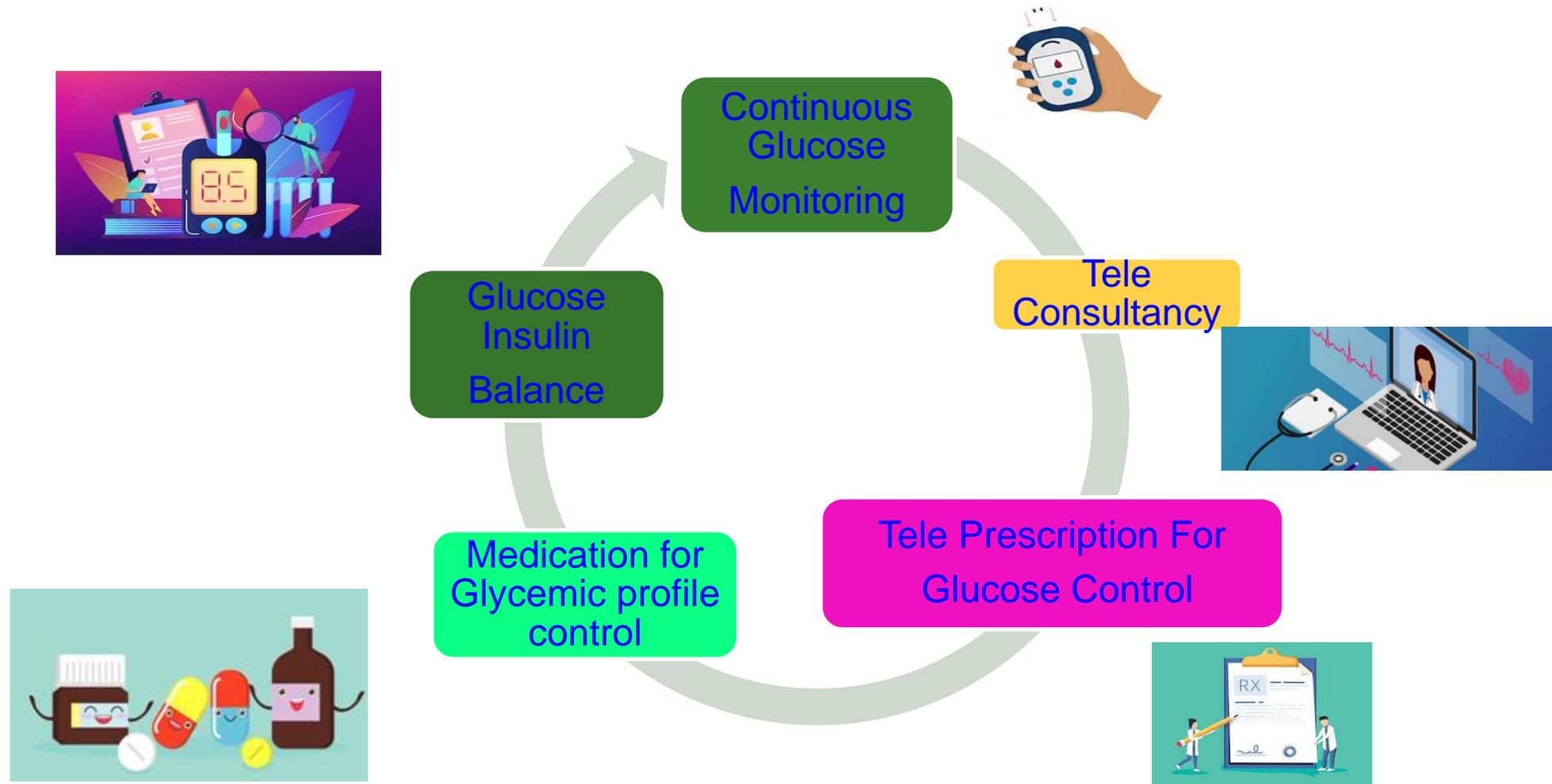
Source: A. K. Tripathy, A. G. Mohapatra, S. P. Mohanty, E. Kougianos, A. M. Joshi and G. Das, "EasyBand: A Wearable for Safety-Aware Mobility During Pandemic Outbreak," *IEEE Consumer Electronics Magazine*, vol. 9, no. 5, pp. 57-61, 1 Sept. 2020, doi: 10.1109/MCE.2020.2992034..

# GlobeChain: An Interoperable Blockchain for Global Sharing of Healthcare Data



Source: S. Biswas, F. Li, Z. Latif, K. Sharif, A. K. Bairagi and S. P. Mohanty, "GlobeChain: An Interoperable Blockchain for Global Sharing of Healthcare Data - A COVID-19 Perspective," *IEEE Consumer Electronics Magazine*, doi: 10.1109/MCE.2021.3074688.

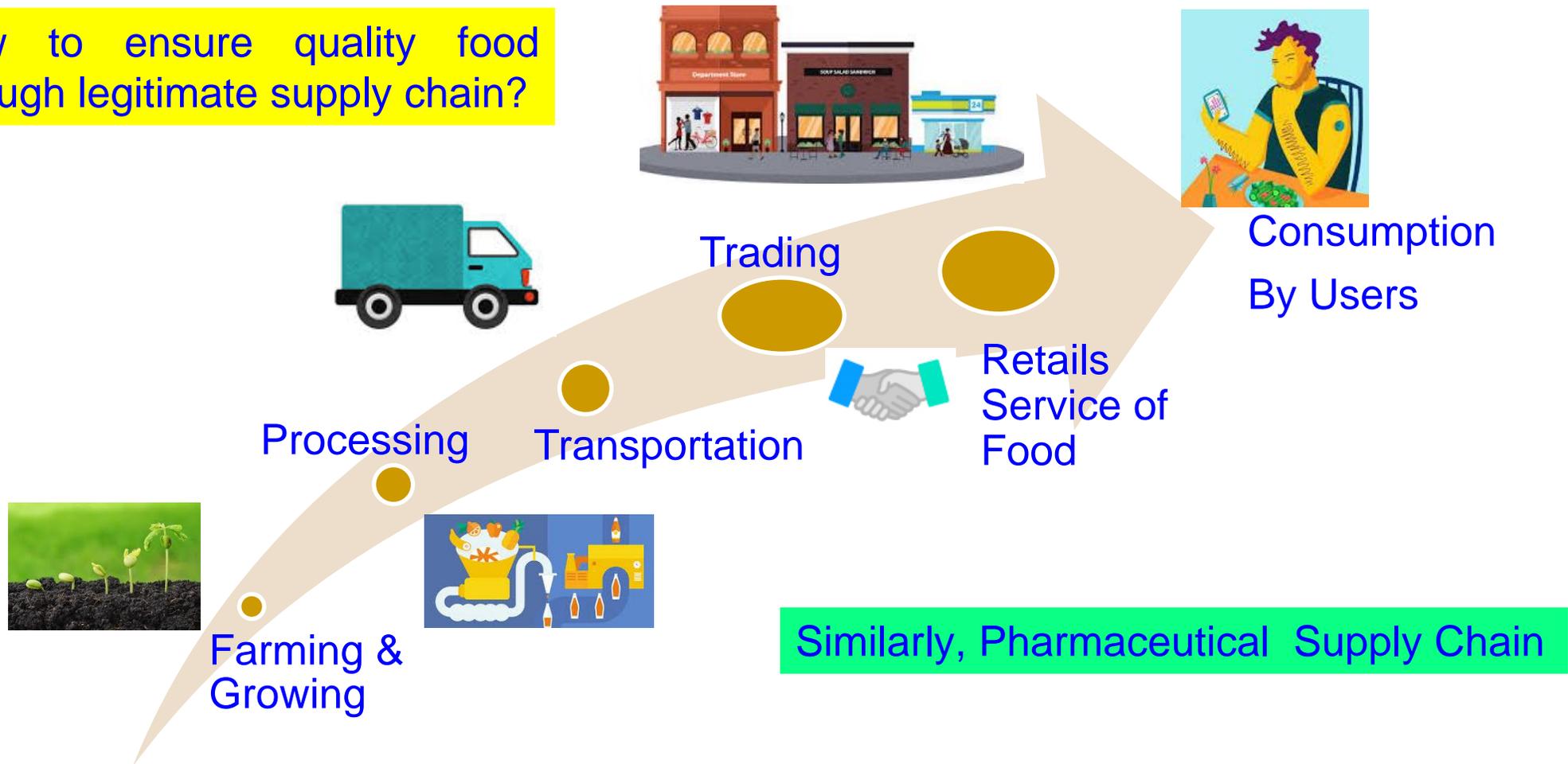
# Pandemic - Role of Smart Healthcare



Source: A. M. Joshi, U. P. Shukla and S. P. Mohanty, "Smart Healthcare for Diabetes during COVID-19," *IEEE Consumer Electronics Magazine*, Vol. 10, No. 1, January 2021, pp. 66--71.

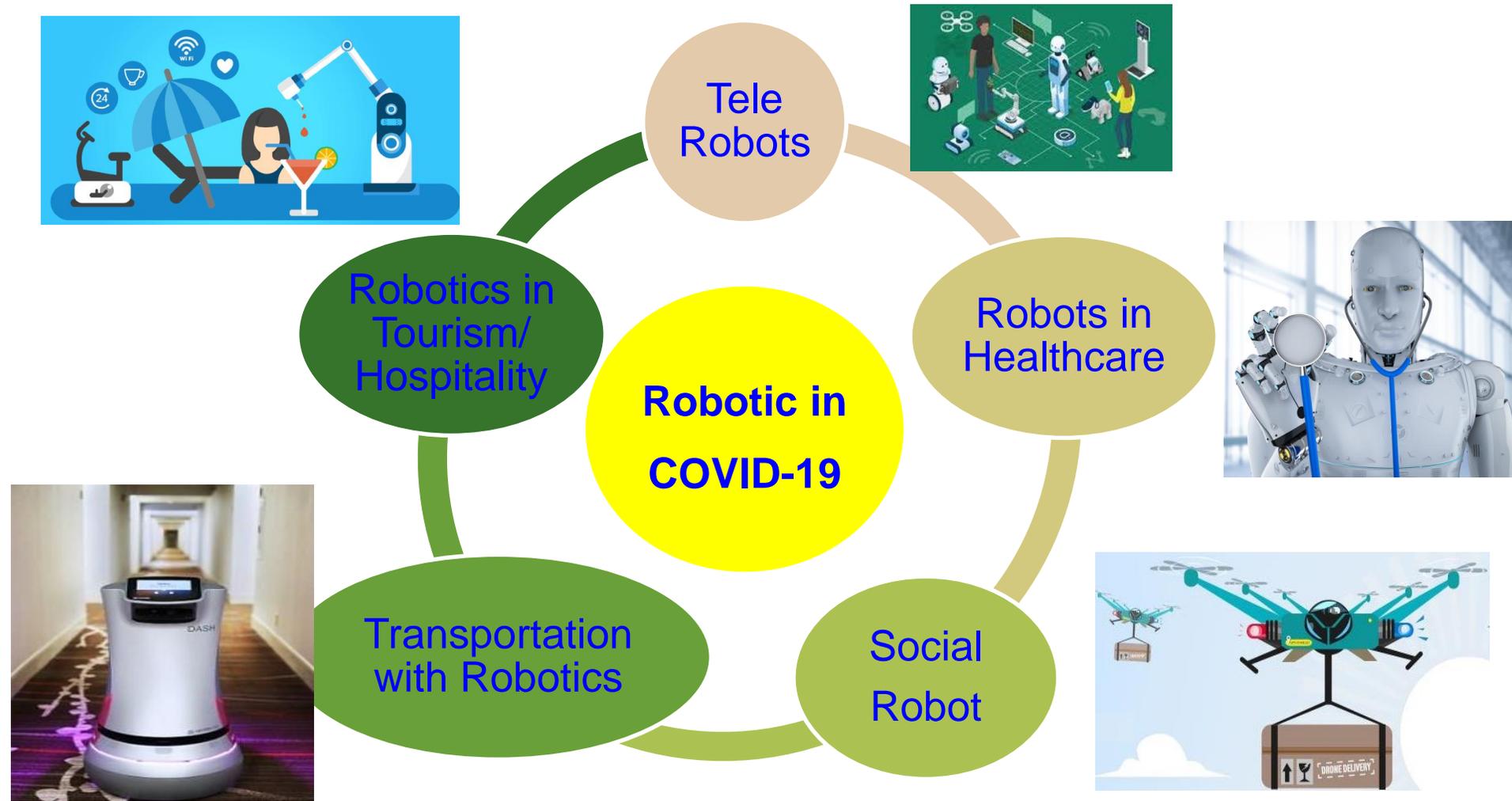
# Pandemic – Trusted Food Supply Chain

How to ensure quality food through legitimate supply chain?



Source: A. M. Joshi, U. P. Shukla and S. P. Mohanty, "Smart Healthcare for Diabetes during COVID-19," *IEEE Consumer Electronics Magazine*, Vol. 10, No. 1, January 2021, pp. 66--71.

# Pandemic - Role of Automation



Source: A. M. Joshi, U. P. Shukla and S. P. Mohanty, "Smart Healthcare for Diabetes during COVID-19," *IEEE Consumer Electronics Magazine*, Vol. 10, No. 1, January 2021, pp. 66--71.

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