



Sensing Systems for Personalized Telehealth Wellness Management



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Motivation

- Early detection of diseases is important in terms of patient health and medical expense reduction.
- A diagnosis based on patient's noticeable symptoms is not enough or too late for discovering some diseases (e.g., Parkinson's disease).

Objective

- Real-time personalized telehealth systems connecting patients and physicians directly are proposed using non-wearable and non-invasive sensors.
- Proposed machine-learning-based systems identify patient's abnormal physical conditions from 1) patient Kinect skeleton data, 2) patient facial expressions, and 3) patient voice messages in real-time.

Benefits to patients

- Real-time feedback can be provided from physicians when patient's abnormal physical conditions are detected.
- The need and time for hospitalization and rehabilitation will be reduced.

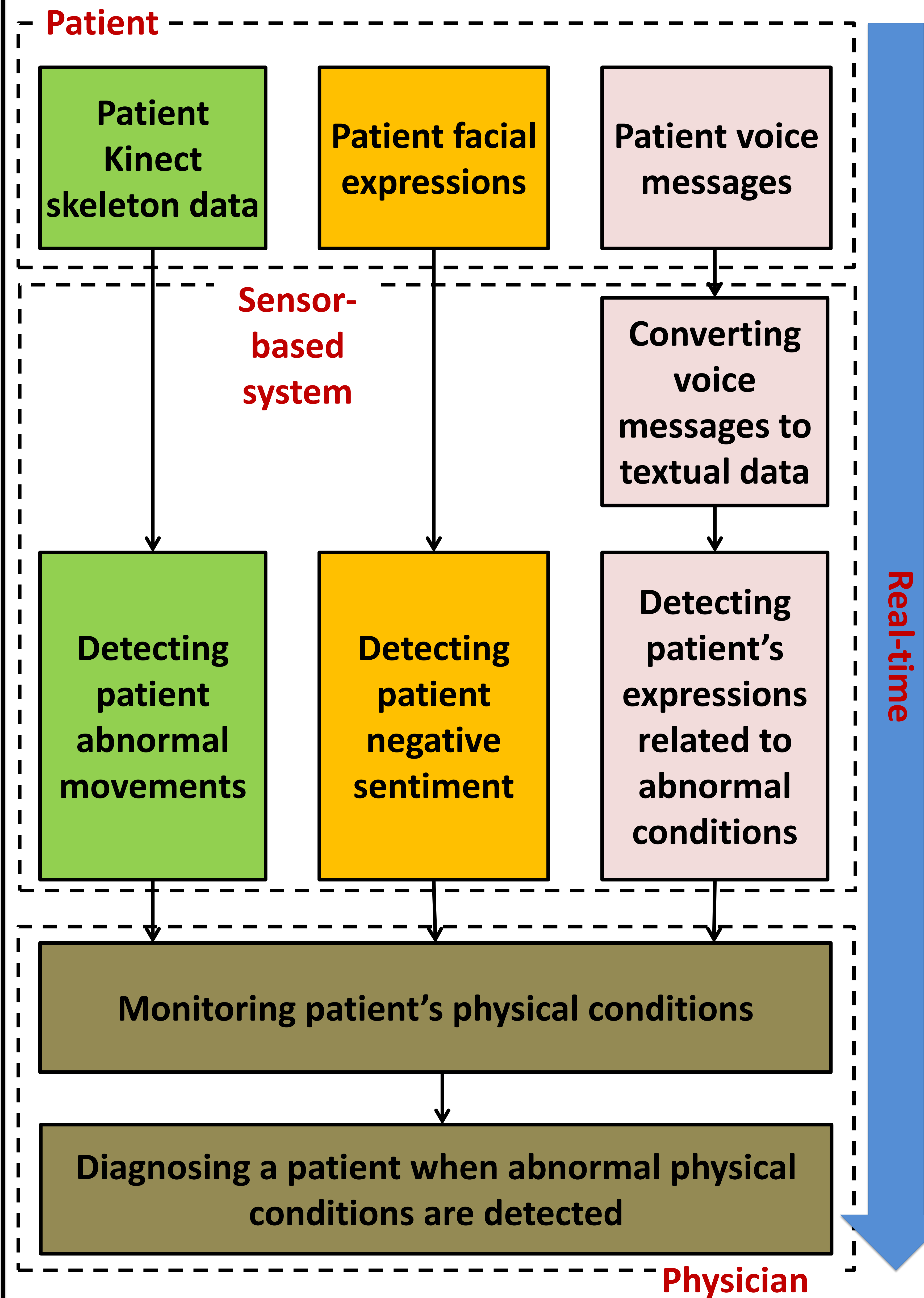
Benefits to healthcare providers

- Unplanned readmissions will be reduced.
- The use of telehealth in inpatient, outpatient, and ED patient care will be expanded.
- Network providers will expand their customer base.

Expected deliverables

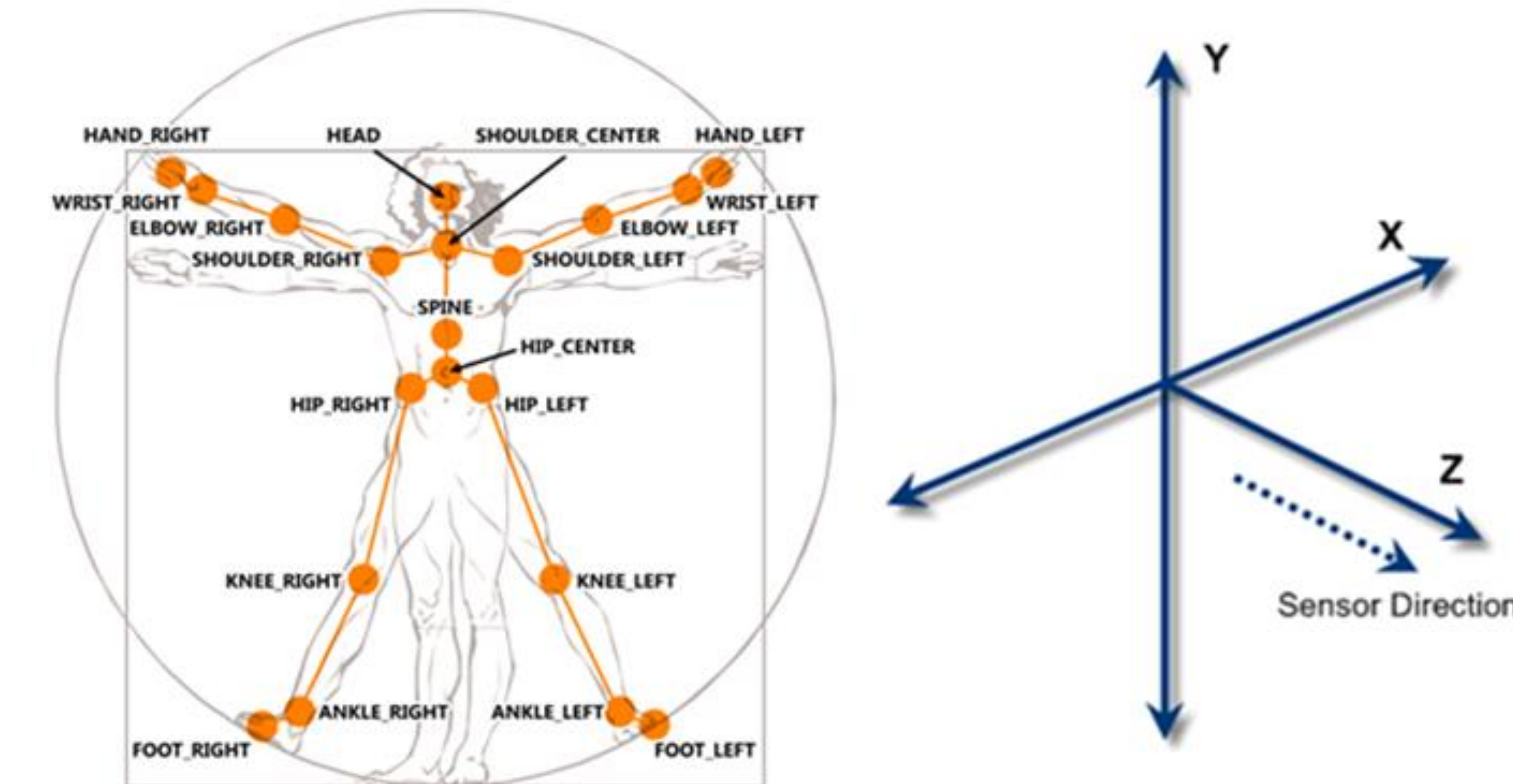
- Sensor-based telehealth systems that are adopted by both patients and physicians will be proposed.

Overview



Data type 1: Patient Kinect skeleton data

- Patient unusual movements can indicate her abnormal physical conditions.
- Proposed sensor-based systems detect patient abnormal movements using three-dimensional Kinect skeleton data and temporal information.



Data type 2: Patient facial expressions

- Patient's abnormal physical conditions can cause her negative sentiment.
- Proposed sensor-based systems detect patient negative sentiment based on her facial expressions.

Data type 3: Patient voice messages

- Patient voice messages can be converted to textual data using real-time speech to text converters.
- Patient's abnormal physical conditions can be identified from textual data using physical-condition-related keywords or labeled training data.