LUX
LIDARUX

LiDAR User eXperience

LUX Lab inc is company working on UX products to generate new user experience. LUX stands for LiDAR User eXperience, which means giving user new user experience with LiDAR technology.

LUX Lab developed "**LiDAR Motion Interface**" and "**LiDAR posture analysis algorithm**".

LUX Lab developed two products based on LiDAR.

LUX D102 is LiDAR motion interface shower system. NeckCare is LiDAR based neck posture care device.

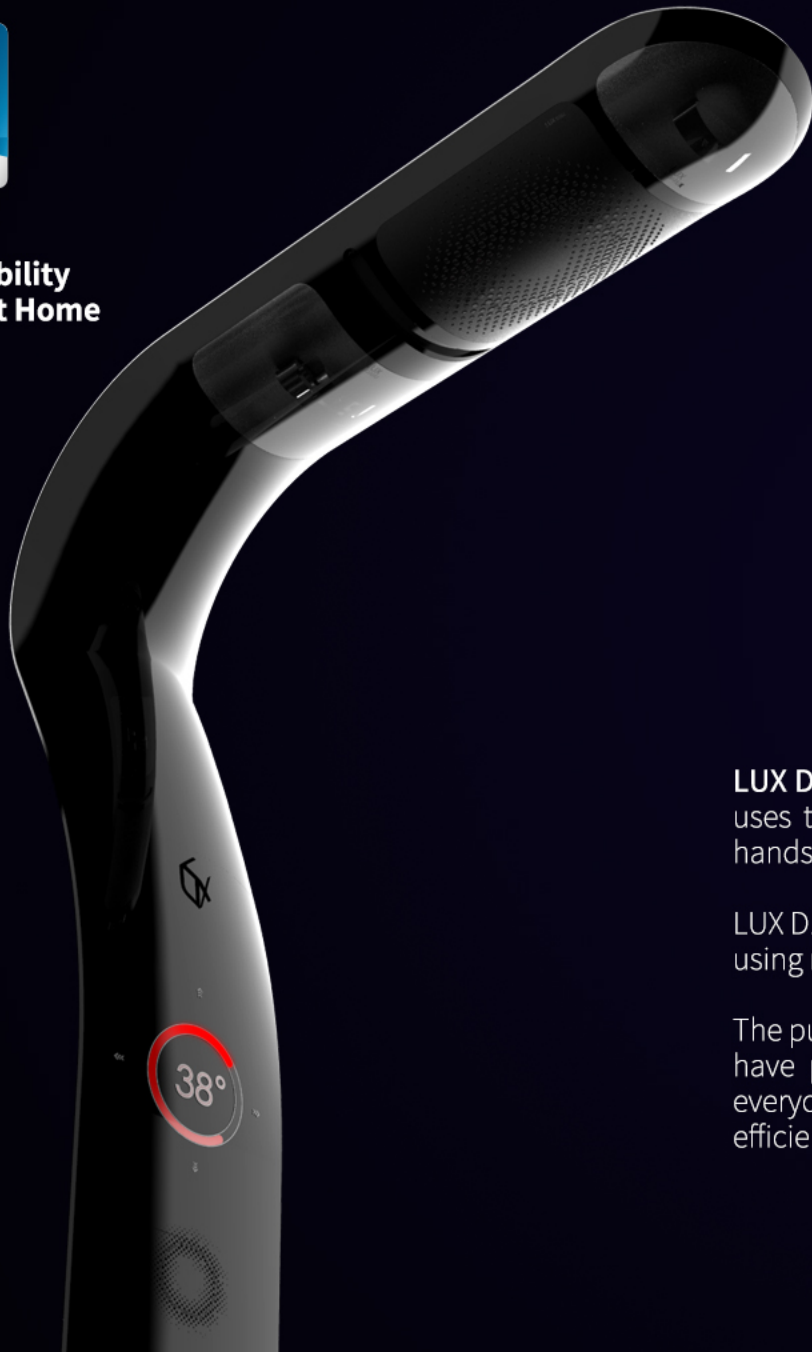LUX Lab inc has PCT patent related to LiDAR and LUX Products.

LUX Lab is developing technology and products by working with "Byun Juyoung, Jung Sunghoon, Yoon Jinyoung, Park Jia, Lee Eunhui", and currently cooperating with Hanyang University D-Lab.

Design is expression and realization through infinite imagination.
Furthermore, design has to be for all".
Based on these concepts, LUX Lab makes product which can be used by various user groups.

LUX D102_LiDAR Motion interface Shower System
LUX NeckCare_Neck Posture Care Device

LUX Lab inc

LIDAR UX

LiDAR User eXperience

Hanyang University
B102, 222 Wangsimni-ro, Seongdong-gu, Seoul

CES INNOVATION AWARDS 2021 HONOREE

Category
**Accessibility
& Smart Home**

LUX D102

Lidar Motion Interface Shower System

LUX D102 (Lidar Motion Interface Shower System) is an **Interface Shower System** that uses the lidar technology that can control temperature or water pressure by moving hands during the shower.

LUX D102 has a Motion algorithm system called LUX MA-03 that analyzes the motion data using micro-controller system to control the shower system.

The purpose of Lux D102 is to provide easier access for everyone, especially for those that have physical restrictions such as disability and elderly. This will eventually include everyone else which meets our purpose of 'Universal Design' that provides the most efficient access.

38°

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LUX D102 (LiDAR motion based shower system) is a revolutionary system that differs from other shower systems which uses lidar technology.

This system is composed of two categories:

The shower system with LiDAR as hardware, and LUX MA-03 (Motion Algorithm) as a software.

With its two accurate lidar systems, LUX D102 can accurately catches the user's motions and converts that into interface signals. With 2 years of research, it made possible for the lidar system to convert motion-based data to certain algorithms.

By checking the movements of hand, users can control temperature by moving hand left&right, and control water pressure by moving hand up&down. the system is able to recognize 25 different motions that may cause an error to system besides the hand movements that control the system.

Also, the system is able to notice any sudden accidents such as slip or fall, thus able to notify and communicate with immediate healthcare facility automatically in case of emergency.

38°

The first keyword is Innovative UX (User-Experience). LUX D102 provides a new and convenient user experience to users by converting interfaces such as touch and lever to a lidar operation interface that was not previously available.

The second keyword is Universal design. Existing showers had to operate a lever to control temperature or water pressure, so it was difficult for people with visual or physical disabilities to use. However, since LUX D102 can control temperature and water pressure with a simple motion without a lever, anyone can use it easily.

The third keyword suggests the new-normal of Smart Bathroom. In the 4th industrial revolution, home appliances were connected through IoT, but smart products for bathrooms that people use every day are not actively released. The LUX D102 is a smart device, and it can provide information by linking shower usage data with an App, or send a notification when a user's sudden accident occurs.

LUX D102 will be a product that expands the smart home field and presents the innovative standard of Smart Bathroom.

LUX Motion Algorithm (MA-03)

Water Pressure Control

In case of swiping up, Movement of **y-axis** increases.
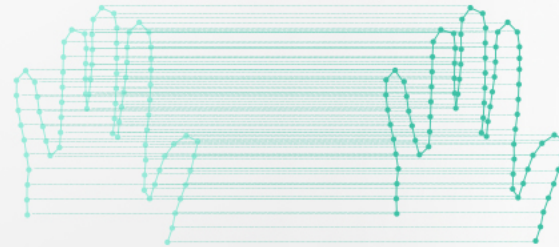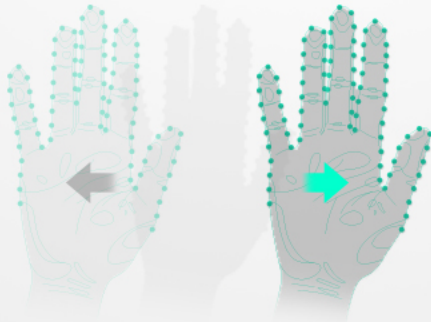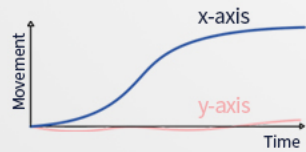Water pressure gets stronger due to this change.
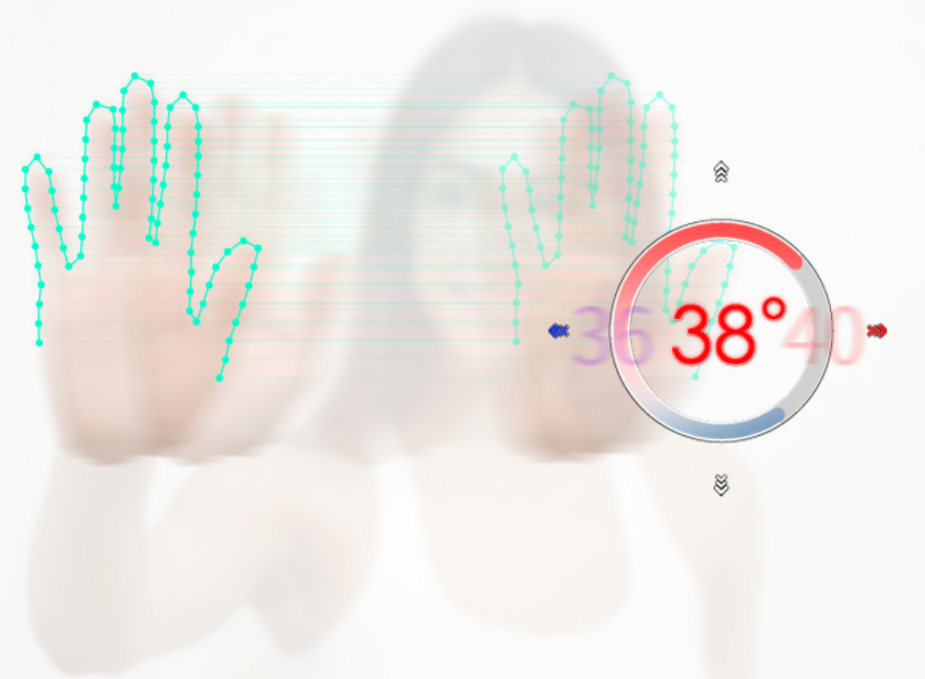
Stronger

Weaker

Temperature Control

In case of swiping right, Movement of **x-axis** increases.
Water gets warmer due to this change.
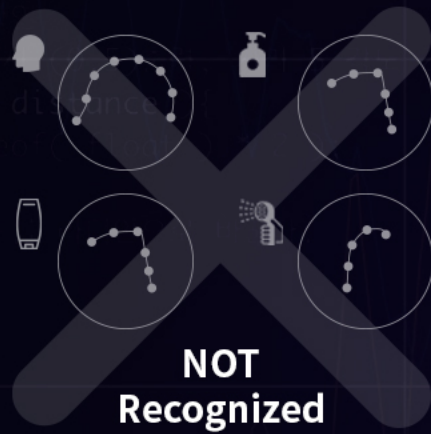
Colder   Warmer

36 38° 40

LUX Motion Algorithm (MA-03)

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1. Recognition Process
| Algorithms to Recognize the hand movements only

Selected Objects
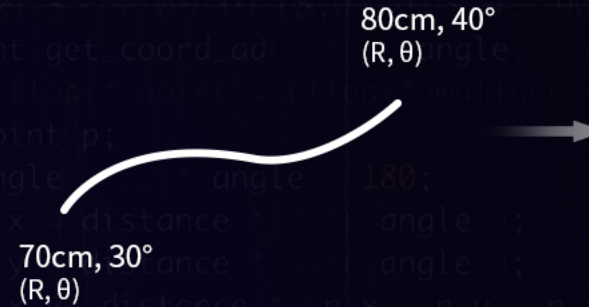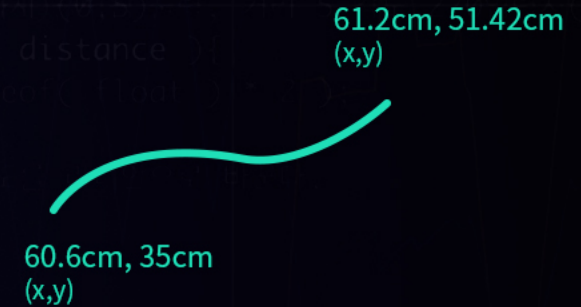
Only Hand Movement Recognized

Excluded Objects

NOT Recognized

2. Coordinate transformation Process
| Transform Lidar Polar coordinate to Cartesian coordinate

Polar Coordinate System

80cm, 40°
(R, θ)

70cm, 30°
(R, θ)

Cartesian Coordinate System

61.2cm, 51.42cm
(x,y)

60.6cm, 35cm
(x,y)

3. Motion Selection Process
| Recognize the motion which is only intended to control temperature and water pressure

Water Pressure Control

Stronger

Weaker

Temperature Control

Colder   Warmer

4. Shower System Controlling Process
| Connected to JAVA Based micro-controller, MA-03 Sends control signal to shower system

① Movements   ② Processing Unit   ③ LUX D102

Category
Smart Cities

LUX
Neck
Care

LUX inc Neck Care is a working environment posture total care device that uses lidar technology.

Neck Care checks users' neck and back posture to prevent 'Forward Head Posture' and Carbon Dioxide concentration to care for user posture and maximize work efficiency.

Neck Care has an algorithm system called LUX HA-04 (Health Algorithm) installed on a JAVA based microcontroller system so that Neck Care analyzes the users' neck and back posture.
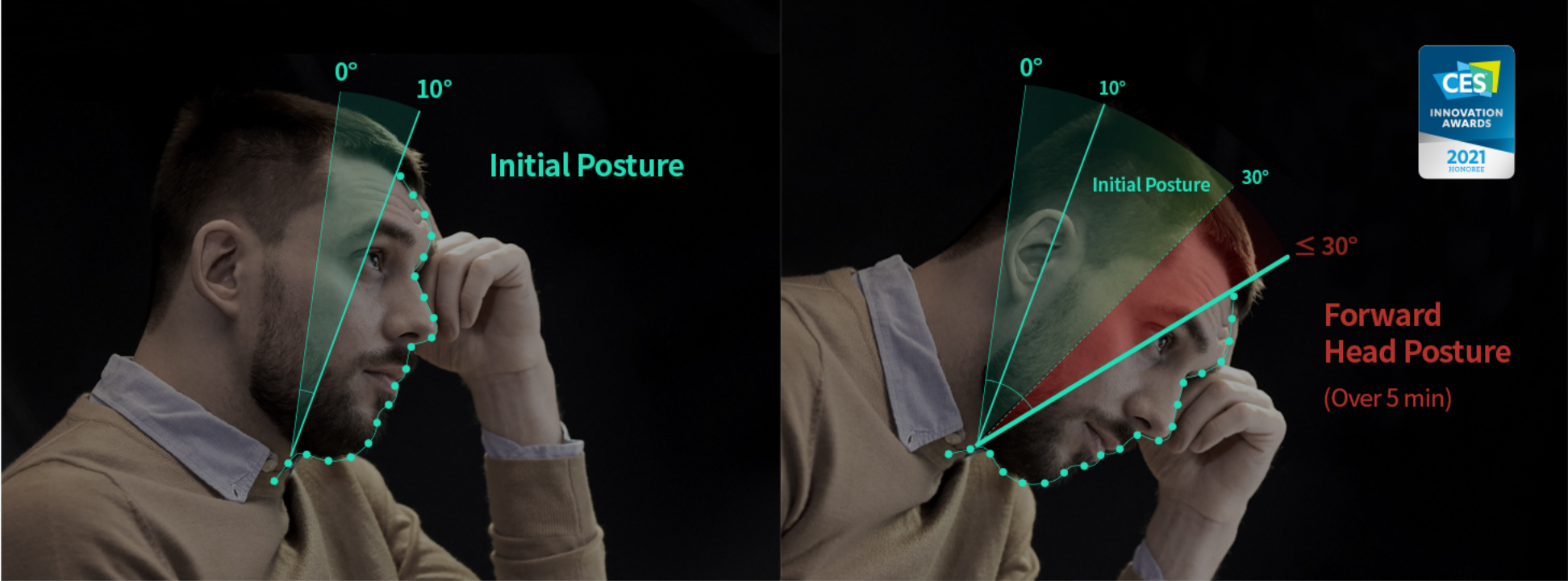
LUX HA-04 is based on the JAVA micro-controller system. First, it's designed to recognize the posture shape only. Second, the data recognized from lidar is transformed through a coordinate transformation algorithm. Lastly, the system can recognize 12 different postures that should be corrected for users' neck or back health. Also, analyzed data is shown by light in the top and bottom of the Neck Care by display algorithms.

In Addition, Neck Care has a CO_2 concentration checking function. Because a high concentration of CO_2 is the main reason for drowsiness and it leads to 'Forward Head Posture'.
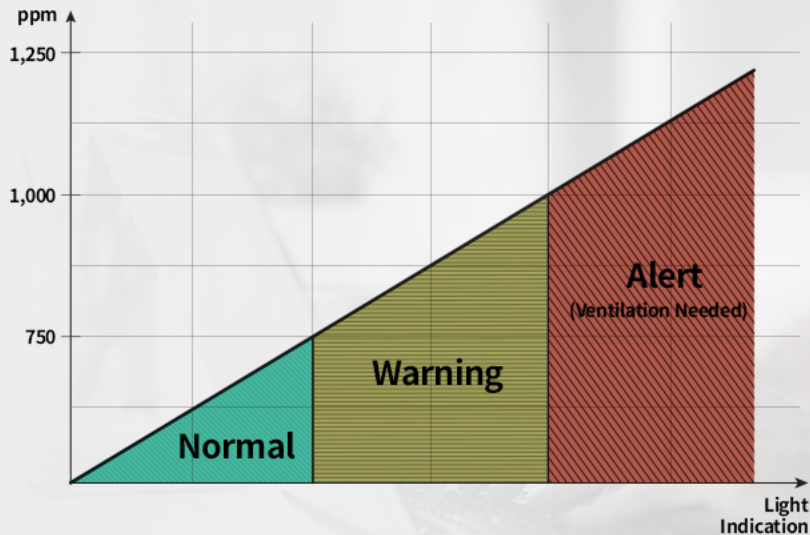
LUX Health Algorithm (HA-04)

Neck Health Measurement

Comparing initial position and current position, Neck Care examines user Neck health

0° 10°

Initial Posture

0° 10° 30°

Initial Posture

≤ 30°

Forward Head Posture

(Over 5 min)

CO2 Concentration Measurement

By examining Carbon Dioxide (CO_2) concentration, NeckCare indicates the needs of ventilation

ppm

1,250

1,000

750

Alert
(Ventilation Needed)

Warning

Normal

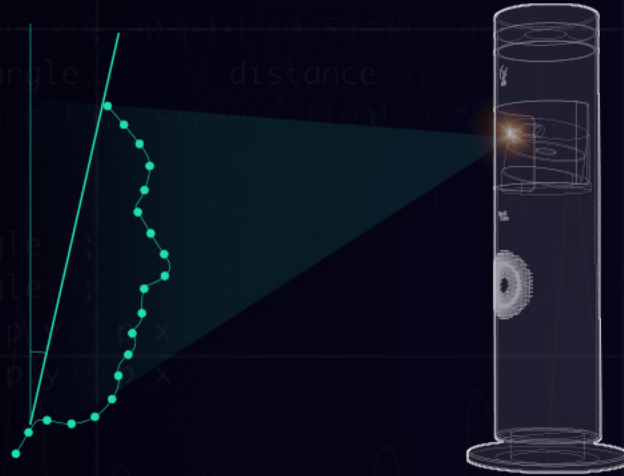Light
Indication

CO_2

LUX Health Algorithm (HA-04)

1. Recognition Process
| Algorithms to recognize only the shape of face

Face Recognition
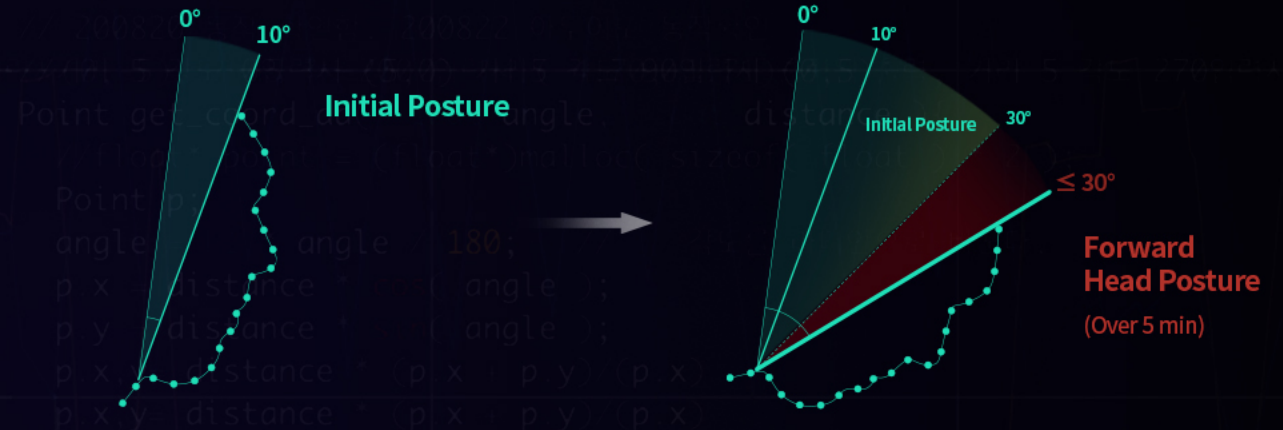
Only Shape of Head Recognized

Excluded Objects

NOT Recognized

2. Neck posture checking process
| Algorithms to check users' neck posture

0°   10°

Initial Posture

0°   10°

Initial Posture   30°

≤ 30°

Forward Head Posture

(Over 5 min)

3. Indication Process
| Algorithms to show current health analysis with light signal

① Posture   ② Processing Unit   ③ LUX NeckCare

Contact Us

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LUX D102_LiDAR Motion interface Shower System
LUX NeckCare_Neck Posture Care Device

LUX Lab inc

CEO
Byun JuYoung

web
www.luxlabinc.com

email
juyoungi7@hanyang.ac.kr

mobile
+82 10 8782 9686

address
(04763)
B234, HIT 222, Wangsimni-ro,
Seongdong-gu, Seoul, Korea

award details
LUX D102 : Accessibility, Smart Home
LUX NeckCare : Smart Cities

patent details
KR Patent : 10-2020-0162667
PCT Patent : PCT/KR2020/017146

Cooperating with

D Lab   **HANYANG UNIVERSITY**