

# 2021

## Application of Smart Medical Technology



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# AI Bed-exit and Fall Prevention Alarm System

## Overview

This product was developed using AI edge computing technology and provides two-phase bed-exit and fall prevention alarm, effectively helping hospitals lower the rate of falling during bed-exit.

Five main product functions:

1. Accurate detection: Uses AI deep learning framework technology, AI skeleton detection technology, and AI bed-exit torso detection technology to monitor bedside events of elderly patients.
2. Environment optimization: When the patient sits up, it turns on the LED nightlight to remind patients and protect their safety when exiting the bed.
3. Reminder to provide protection: When a patient is sitting at the edge of the bed but no one is around to provide assistance, the alarm will turn on.

4. Seeking assistance: When a patient falls, a warning notice will be immediately sent to the app of the primary nurse and the nursing station, so that they can provide immediate help and minimize the harm done.

5. Management system: Nursing station monitors patients' posture and movement at all times. To prevent false alarms the system also needs to determine (1) is the patient alone, (2) is it a continuous motion from laying on bed → sitting up → sitting at the edge of the bed (both feet hanging down) to trigger a bed-exit alarm.

## Benefit

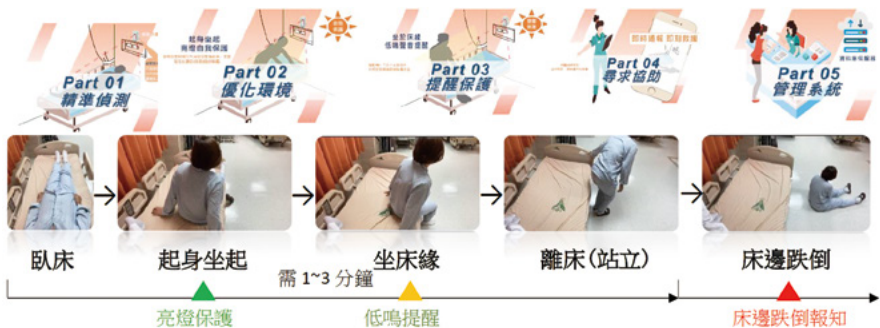
1. Accuracy in the experimental ward reached 99%.
2. Lights automatically turn on when patients are getting out of bed and the alarm sounds, effectively helping the hospital reduce the occurrence of falls.

3.The system can be applied in wards with patients at high risk of falling (such as: orthopedics, psychiatry, and hospice care). It can also be

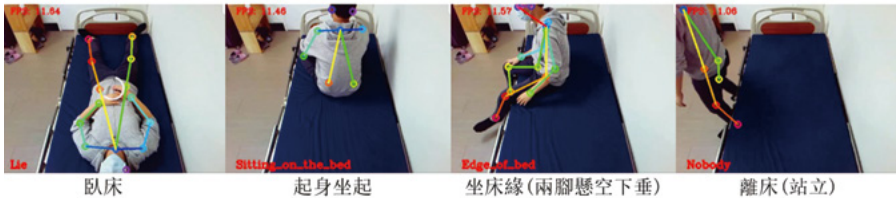
applied in long-term care institutions, nursing institutions, apartments of the elderly, and even bedside fall prevention for elderly living at home.



Product



Process of the bed-exit and fall prevention alarm system with five key functions



Experiment results of the AI torso image recognition algorithm

## About the Hospital

The hospital has 883 emergency hospital beds, and the total number of hospital beds is 1,284. The hospital includes a total of 39 departments, such as Department of Medical Science, Healthcare Center, Nursing Department, Medical Technology and Teaching Research Departments, a total of 13 administrative departments and a total of 45 medical and hospital affair related committees. Currently, there are 3,600 employees in the hospital. The core value of the hospital is “Care, Professional, Efficiency”. The hospital also upholds the patient-based spirit along with the goals of “develop quality characteristic healthcare”, “research with innovation, cultivate quality talents”, “improve process, increase service quality” and “flexible

management, sustainable operation” in order to construct the organization culture of excellent healthcare quality, guarantee patient safety and protect the benefits of patients, thereby promoting the health of the public and employees and becoming a healthcare system trusted by the public the most.

## Keywords

Artificial intelligence, Bed-exit and fall prevention alarm system, Falls

### Contact Details

Department of Nursing, Chi Mei Medical Center

### Cooperation Partners

Artificial Intelligence over Internet of Things Applied Research Center, Southern Taiwan University of Science and Technology

Industrial  
Application

Hualien Armed Forces General Hospital

# Disaster Disposal Simulation Teaching System

## Overview

There has been frequent natural and artificial disasters in recent years, and this has brought attention to the importance of medical treatment when a disaster occurs. The hospital utilized virtual reality technology in disaster medicine education to promote knowledge and skills of the field, raise learners' interest, reduce cost, and improve learning effectiveness.

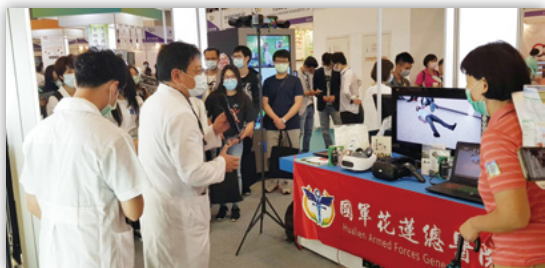
The system aims to make treatment drills as realistic as possible, and added voice recognition and gesture control. The eyeglasses show scenarios of patient treatment during a disaster. The realistic environment combined with virtual patients, virtual AED, cardiac rhythm management devices, and command prompt allow users to simulate being a commander with full view of the entire scenario. This will help cultivate commanders when a disaster occurs.

## Benefit

The system offers students with a realistic experience, reduces dizziness during operations, lowers the burden on computer systems, and reduces implementation cost. The system aims to achieve smart training for high quality care. The hospital collaborated with the multimedia industry in developing a smart care training system based on the 5S "Science, Serious, Strength, Safe, and Sharing," and continues to promote technology applications among partnering institutions.

The knowledge, attitude, and skills of students trained using the disaster disposal simulation teaching system significantly improved compared with before training, and their satisfaction reached 90% and above. The system's operations makes it easier for students to remember the care process during a disaster.

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## About the Hospital

Hualien Armed Forces General Hospital is an emergency responsibility hospital in Hualien County, and works closely with the 119 Service Command Center to rescue patients. The hospital is responsible for emergency care in the area, supports first aid when a disaster occurs and there are a large number of patients, and also participates in military and civilian exercises.

The hospital provides 24-hour emergency care services, and works together with numerous long-term care institutions and veterans institutions. The hospital stands at the front line

of healthcare and aims to improve the quality of emergency care for catastrophic disasters in coordination with the domestic emergency medical network.

## Keywords

Augmented Reality, Disaster disposal simulation teaching, Mass Casualty Incident, Mixed Reality, Virtual Reality, Simulation

### Contact Details

Teaching and Research Office,  
Hualien Armed Forces General  
Hospital



# nFOPT® & Smart Care Sysetm

## Overview

The nFOPT® smart care system uses innovative optical fiber technology that is not worn and does not have any electromagnetic waves to provide 24-hour automatic safety and health inspections, in hopes of lifting the burden on home, long-term care, and medical institutions, improving the quality of care while contributing to epidemic prevention. Elderly people have trouble clearly expressing themselves and often have comorbidities. The system is able to continuously track possible conditions during early stages, such as breathing, heart rate, coughing, sleeping quality, and various physiological activities. By placing a 2 mm smart optical pad underneath the pillow and bedsheets, the system is able to achieve highly sensitive and highly accurate physiological monitoring. It also provides remote real-time monitoring around the clock, abnormality notifications, health reminders, bed-exit and turning warnings, and sleep records. The system uses AI to track coughing and if turning over and back patting was properly performed. It automatically keeps records and sends

warnings to reduce the impact of bedsores, reducing the need for manual transcription.

### System functions

1. Physiological monitoring: Real-time monitoring of breathing/heart rate/movement
2. Sleep mode: Awake/asleep/turning/bed-exit
3. Sleep management: Awake, light sleep, deep sleep, and statistics of daily/weekly/monthly records
4. Sleep assistance: Ventilator (optional)
5. Bed-exit prompt: Customized setting for bed-exit (stand up) prompt
6. Health management: Customized setting for breathing too fast or slow prompt/suspend prompt/suspicious cough (optional)
7. Thoughtful functions: Reminder to take medications/environment temperature/home appliance connection/health equipment, and robot functions (optional)
8. Automatic turning management assists with bed sore management (evaluated and implemented)
9. Provides API for interfacing with evaluation systems or care platforms
10. Ultra thin and easy to quickly install; monthly service fee collected

## Benefit

### 1.Application promotion

- A total of 35 nursing institutions and hospitals are already using this system for care and epidemic prevention.
- Currently being used in nursing institutions in Japan, and there are ongoing negotiations with over 10 Taiwan and overseas institutions.

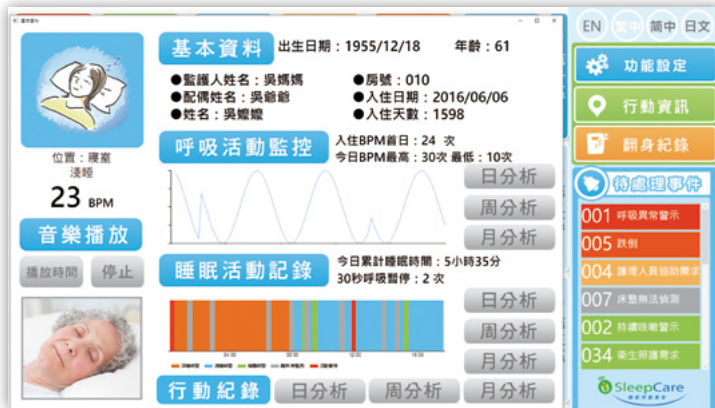
### 2.Benefits of system implementation

- For institutions: Lifts the burden on health workers through 24-hour automatic inspection, taking care of multiple people while achieving epidemic prevention.
- For the head nurse: The active warnings reduce long-term stress on nursing personnel.
- For caretakers: Customized warning services help care for patients in different

beds and increase the productivity of personnel.

- For physicians: Big data from health management is automatically recorded, and the continuous data serves as a basis for tracking improvement or deterioration.
- For elderly people receiving care: Abnormalities caused by comorbidities can be discovered sooner.
- For family members: 24-hour care makes family members feel more at ease and builds trust and confidence between institutions and family members.
- Informatization: The API can be used for interfacing with evaluation systems and generate records and reports.
- Easy to install, monthly service fees are widely accepted, and suitable for both homes and institutions.





## About the Organization

Huijia Health global original technology-Non-invasive Fiber Optic Physiological Monitoring Technology (nFOPT®) and the Smart Care System use the principle of optical fiber reflection. It is a high-sensitivity and high-accuracy physiological sensor that can monitor changes in physiological activities such as breathing, heart rate, blood pressure, sleep analysis, and movements. Product applications include smart (bed) pads, smart beds, smart wheelchair cushions, smart assistive devices, smart care systems for taking care of elders and babies simultaneously.

The technology has won the 2019 ECI

Awards, 2017 R&D 100 Awards, 2017 Medical Quality Awards, and 2016 APICTA National Innovation Awards. The technology has been adopted in over 300 baby hospital, maternity center, baby sitting center and elderly care centers.

## Keywords

Epidemic prevention technology, Health Measurement, Non-invasive Fiber optic Physiological Monitoring technology, Smart care film, Smart care mattress, Smart care system, Physiological monitoring

### Contact Details

Department of Marketing & Planning,  
Huijia Health Life Technology Co., Ltd

Industrial  
Application

MEDWEL, Inc

# MEDWEL Smart Measurement System

## Overview

Smart measurement equipment solutions can be used to collect physiological data and be seamlessly connected to the HIS, in order to more efficiently connect to medical equipment offer advanced smart healthcare services.

The main product 10.1" AIO PC has obtained IEC60601, CE, and FCC Class B certifications. It can be combined with current equipment of hospitals due to its flexible design, such as electronic blood pressure monitors or scales. The patient only needs to insert his/her National Health Insurance card and measurement results will be automatically recorded and uploaded to the hospital's database, which can be immediately accessed by the physician in the consulting room. Customized human-machine interface guides patients to complete measurement procedures. During the

pandemic, it will help reduce contact between health workers and patients to reduce the risk of infection.

MEDWEL also provides evaluation and design services for connecting current devices, so that hospitals do not need to purchase new machines, reducing the initial cost of hospitals implementing smart measurement solutions.

## Benefit

MEDWEL has successfully implemented the smart measurement system in numerous medical institutions in Taiwan, and application scenarios include clinic, pediatric ward, and medical ward. The solution can upgrade existing measurement equipment to automatically upgrade measurements. Patients can insert their National Health Insurance card or have nurses scan the barcode to verify their identity and allow the data to be automatically

uploaded to the HIS. This shortens the measurement process and fully utilizes human resources.

Health workers can save time on transcription and input and focus on care and interactions with patients,

providing patients with better services. It also reduces incorrect medical records and provides physicians with sufficient information during diagnosis, in order to gain the best treatment results.





## About the Organization

MEDWEL was originally a subsidiary of Taiwan industrial computer manufacturer Portwell Inc., which has 25 years of professional experience in industrial computer design and manufacturing. It was recently merged with Posiflex in hopes of achieving vertical integration. MEDWEL focuses on the design, manufacturing, and service of embedded computers, touch screen tablet PCs, Kiosk in hospitals, and smart healthcare software and hardware integrated solutions. It allows different

customers to directly find "solutions for connecting front end to back end and integrating software with hardware," meeting the demand of different units on IT equipment.

## Keywords

Blood pressure monitor, Connected to HIS, Smart hospital, Medical computer, Upload measurements

### Contact Details

Department of Innovative Technology  
Development, MEDWEL, Inc

# Smart Dispensing Counter

## Overview

In the dispensing process, pharmacists may make mistakes due to medications having a similar name or appearance, being unfamiliar with operations, fatigue, and not double checking. The hospital jointly developed the smart dispensing system together with the Industrial Technology Research Institute and National Tsing Hua University in 2014.

The system combines a dispensing counter with a smart dispensing system. After scanning the QR code on the medicine bag, indicators for corresponding compartments will turn on, using visual, audio, and perception reminders. The human-machine integrated design is suitable for all types of medications on shelves and in drawers, and can hold over 400 types of medications.

The system is the first in the world and has obtained patents in numerous countries. It is able to fully meet the needs of dispensing and can

provide customized software and hardware services for different medical environments based on operating procedures and space. The system features movable partitions, plug and play, high energy efficiency, easy installation, and quick launch.

## Benefit

Avoiding human error is an important issue due to the large amount of manpower required for dispensing. After implementing the system, pharmacists no longer need to remember matters unrelated to their expertise (such as: the location of medications), and do not need to bear the mental stress of making a mistake during dispensing. The system makes dispensing more accurate and efficient, and achieves the goal of zero dispensing errors. It effectively shortens the training time of new pharmacists, lifts their workload, and reduces the amount of time spent by pharmacists on review by approximately 50%, allowing pharmacists to fully utilize

their expertise.

The system is applicable to pharmacies in hospitals at all levels, and can also be used by nursing stations, operating rooms, or anesthesiology departments. It can be used for the management

of general medications, and can also be used for the management of high value medical devices. Combined with smart storage spaces, the system is able to increase benefits from storage management.







## About the Hospital

Changhua Christian Hospital and hospitals in the system have a total of 8,500 employees and over 3,600 beds to form a complete healthcare network.

The hospital has expanded its overseas healthcare services in recent years, and engaged in healthcare diplomacy in coordination with the New Southbound Policy, sending medical teams to friendly countries in the Asia Pacific, West Asia, Latin America, and Southern Pacific, where they built relationships with the healthcare industry and donated

supplies to improve the quality of healthcare services and professional skills.

## Keywords

Guiding dispensing, Human-machine integrated, Smart dispensing Counter, Three senses reminder, Zero dispensing errors

### Contact Details

Department of Pharmacy, Changhua  
Christian Medical Foundation  
Changhua Christian Hospital

Industrial  
Application

aHOP Co., Ltd

# aHOP Smart UDI – Bone Screw and Bond Plate Traceability Solutions

## Overview

aHOP began focusing on providing automatic identification (barcode) applications in the healthcare industry in 2016, and completed the hospital UDI barcode application system, as well as the UDI data collaboration platform for suppliers and hospitals, in 2018, which offers medical device traceability functions. It upgraded the set pricing function in 2019, and resolved the issue of pricing based on sets but being unable to record all the individual medical material. It completed bone

screw and plate tracking, which is the most complex and difficult in practice, in 2020 and resolved the issue of not being able to identify and record bone plates and screws after they are removed from the package for sterilization in hospitals before use.

## Benefit

The performance of aHOP's identification and tracking application for bone screws and plates in hospitals and suppliers as of 2020 is as follows:

- 1.Database creation

- Sets: Nearly 3,500 sets
  - Bone screw and bone plate case/  
instrument case: Nearly 400 types
2. Hospital implementation: 16 hospitals  
(10 medical centers and 6 regional  
hospitals)
3. Number of items with UDI: Nearly  
100,000

4. Number of items across hospitals:  
Over 230,000
5. Number of suppliers of items with  
UDI: Over 1,000 suppliers
- The bone screw and bone plate system  
has obtained utility model and invention  
patents, and made a breakthrough in  
management by current healthcare  
institutions!



## About the Organization

aHOP Co., Ltd. focuses on the development of an automatic identification (barcode) information sharing platform for Taiwan healthcare industry. Suppliers can create/update barcode data of medical devices on the information sharing platform, and the data will be updated on all hospitals, popularizing the application of barcodes by healthcare institutions.

"aHOP One-Stop Platform – Medical Sharing Economy" consists entirely of proprietary technologies that have obtained 7 utility model patents and 5 invention patents, which collaborating hospitals are authorized to use free of charge. aHOP not only specializes in

barcode coding/decoding/software and hardware, but is also familiar with the needs of clinical units in hospitals, and is experienced in integration with hospital data and systems.

## Keywords

aHOP information flow, aHOP One-stop platform – medical sharing economy, Bone screw and bone plate case applications, Passive cloud data exchange system, Smart sets, Tracking and traceability, Unique device identification (UDI)

### Contact Details

Department of Management, aHOP Co., Ltd

# Clerkship Without Entering a Hospital – Cloud Training System

## Overview

The Virtual Training System for Clinical Diagnosis and Treatment V-DxM allows trainees to interact with virtual patients in a virtual hospital. Students face health problems brought by virtual patients, and use the history taking, physical examination, laboratory, and imaging examination process to analyze and summarize data and their own thoughts to make a clinical judgment. After diagnosis and treatment is completed, students immediately receive their score and descriptive feedback.

Students learn diagnosis and treatment through practice by interacting with patients, which increases their learning motivation and makes learning fun and effective. Virtual patients can replace cases on paper and standardized patients, assist with bedside teaching and teaching in the clinic and emergency room, giving students experience

with "patient" contact earlier on. Students repeatedly practice in a safe environment where they are allowed to make mistakes until they become familiar with procedures. This bridges the gap between learning in classrooms and clinical care, and allows clinical education to take strides towards a new milestone. At present, the system has been implemented in 9 schools/hospitals.

## Benefit

Implementation benefits:

- 1.Improves diagnosis ability, not only decision-making ability, but also thinking ability when it comes to diagnosis and treatment.
- 2.Virtual patients interact using natural language, which makes self-learning more interesting.
- 3.Provides a virtual site for diagnosis and treatment, giving learners a realistic clinical experience.

- 4.The system records the entire process of drills and provides students with both qualitative and quantitative feedback.
- 5.Trainees are required to analyze their thoughts during drills, and demonstrations of how experts think are provided to improve learning effectiveness.
- 6.A variety of courses are available in the system as auxiliary teaching materials to improve learning results.
- 7.Realizes participatory education and testing, and saves cost and time compared with training on real people. The system can be used by a large number of examinees/students at the same time.
- 8.Clerkships have become difficult due to the pandemic, and virtual reality training and testing provides realistic experience with cases.
- 9.VP-PBL course study showed that

- the experimental group (uses VP) scored significantly higher in diagnosis compared with the control group.
- 10.VP can improve students' inquiry ability and diagnosis and treatment ability in English.
- 11.The National Clinical Skills Competition shows that the product can improve testing quality, overcome limitations of conventional OSCE, and reduce the cost of training and hiring standard patients and examiners.





## About the Organization

The Company was established in 2008 and was originally named Landseed Asia Academy. It was formally renamed Innova Medical Technology in 2020. The Company integrates multimedia technology with smart healthcare, and utilizes virtual reality, AI, and IoT technologies to develop prospective, innovative, and smart healthcare education systems and teaching materials. It also provides implementation strategies to improve the quality of medical talent and the quality of healthcare.

## Keywords

Performance assessment, Medical cognition, Virtual technology, Clinical reasoning, Clinical decision, Human-computer interaction, Virtual patients

### Contact Details

Division of Administration,  
Innova Medical Technology