DUY TAN UNIVERSITY

SCS
DUY TAN UNIVERSITY
SCHOOL OF COMPUTER SCIENCE

CVS
THE CENTER FOR VISUALIZATION & SIMULATION

COMPETENCY PROFILE

THE CENTER FOR VISUALIZATION AND SIMULATION

Le Van Chung

25 November, 2024

http://duytan.edu.vn
http://scs.duytan.edu.vn

Access ⇨

The Center for Visualization & Simulation (CVS)

We are a pioneer in research and development of 3D simulation technology, applying the most advanced technologies to create vivid and realistic experiences.

Target

Pioneer in 3D simulation technology, providing unique user experiences and establishing sustainable strategic partnerships

Technological Innovation

Research and develop advanced 3D simulation technologies, meet increasing market needs and improve efficiency in application fields

Enhance Experience

Create easy-to-use, user-friendly products and solutions that optimize interactive experiences in 3D space

Strategic Partnerships and Partnerships

Build cooperative relationships with organizations, businesses and schools to develop joint projects and expand the application of 3D simulation technology in many different fields

Staffing

Software R&D Team

Research and develop digital products, 3D simulation, database management,... on website platforms, software operating on iOS, Android, Windows, Linux operating systems

AI R&D Team

Research and apply artificial intelligence to simulation and digitalization solutions. Develop AI algorithms that automate processes, analyze big data, and optimize system performance

IoT R&D Team

Create smart devices that connect to each other over the network, collecting and transmitting data from the real environment. Build remote monitoring and control systems, combined with sensor technology to optimize simulation and digitalization

2D/3D Design Group

Responsible for creating intuitive and realistic models, from 2D drawings to 3D simulations. Design and digitize products, spaces, or experiences to support innovative and technological projects

Research field

Aiming to apply advanced technology to digitize data, simulate reality, and develop solutions that meet social needs in an effective and innovative way

3D Simulation and Virtual Reality (VR/AR)

Artificial intelligence and machine learning (AI/ML)

The Internet connects everything (IoT/AIoT/IIoT/...)

Research Products

SIMCAR

3D system simulates automobile mechanics

3D printing

3 D printing in treatment orthopedic trauma

DTU-Mind

AI chatbot follows the User-Bot Interactive model

DTU-Case

Application of Error Avoidance Practices in Medicine

Human Anatomy

3D system simulates the human body

Dental Anatomy

3D system simulates Dental practice

eCPR

Training system
Revitalize Heart Lung

AED-302

Automatic extra-thoracic cardiogenic shock machine

Human Anatomy

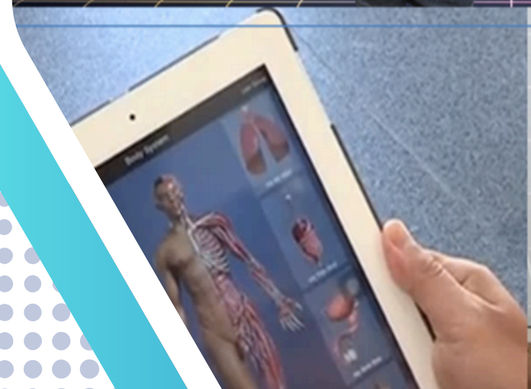
The 3 D system simulates the human body supporting anatomical learning, teaching and research

Current situation

Originating from difficult conditions for human corpses (scarce corpse sources, not well preserved, body structure through stages is no longer intact)
Learning based on slides, images, plastic, plaster models that don't realistically simulate blood vessels, nerves,...

Solution

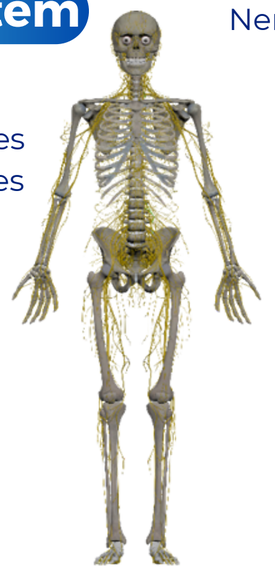
Create a complete virtual body with a full range of organ systems such as: Skeletal, Muscle, Circulatory, Nervous, Respiratory, Digestive, Excretory, Genital,... These systems are full of anatomical details smallest and completely similar to real people
Cross-platform operation in today's smart devices



Simulate organ systems

Skeletal system

Head bones
Upper limb bones
Lower limb bones
Spinal bone
Thoracic bone
...



Neurology

Brain nerves
Spinal cord nerve
Nervous system

Muscle system

Thoracic - abdominal muscles
Dorsal - shoulder muscles
Pharyngeal muscle – neck
Head muscle
Upper limb muscle
Lower limb muscles

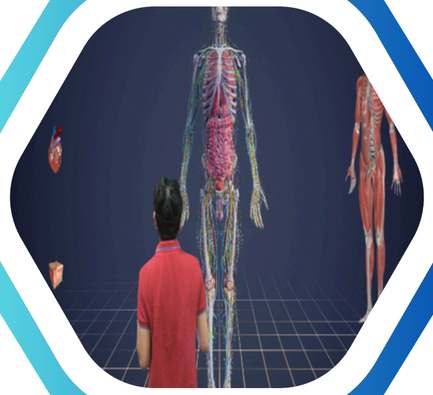
Other systems

Glands and nodes
Circulatory system
Genitourinary system
Digestive system
Excretory system
Respiratory system

Usage environment

Virtual Reality

Augmented Reality



Big Screen

Android

iOS

Dental Anatomy

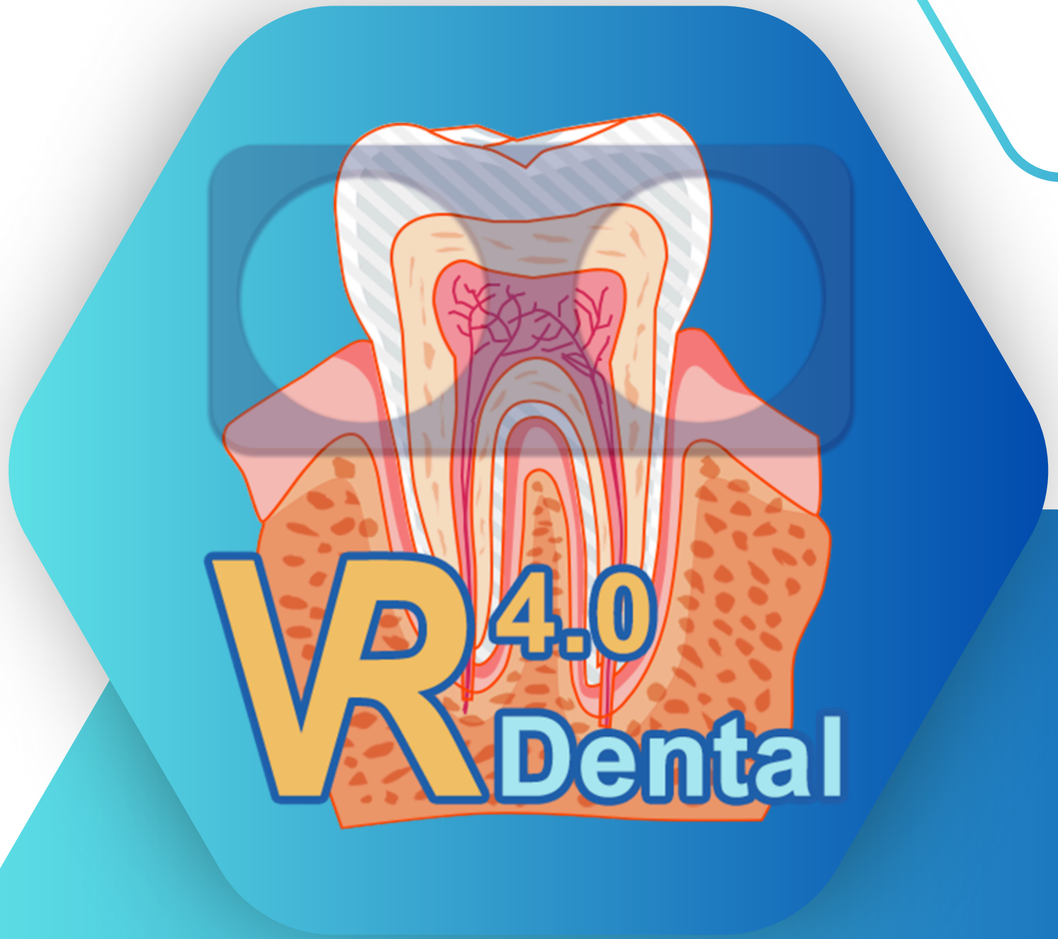
3D system simulates dental practice

Current situation

Equipment for learning dental anatomy, such as dental models, dental equipment, or simulated jawbone, is limited
Dental anatomy is a complex subject that requires a deep understanding of the structure, shape and function of each tooth

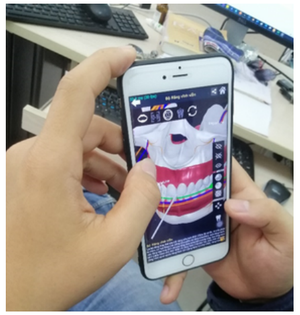
Solution

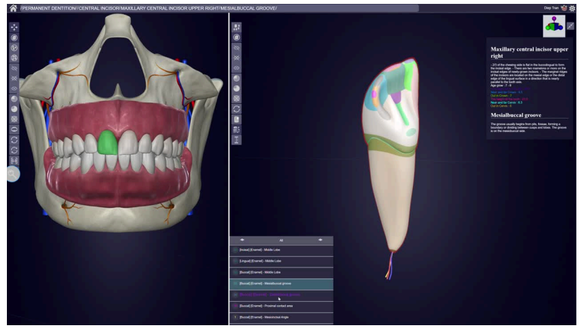
Learning support: provides full features to support learning about dental anatomy, 3D simulation application on VR/AR
Detailed simulation of a set of teeth: detailed design based on references from slides as well as from real human teeth

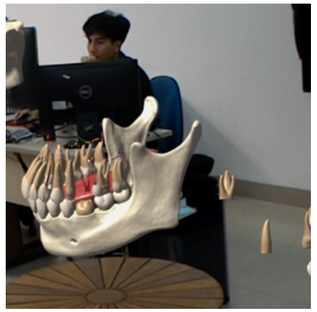


Dental Anatomy

Product functions







Learning - Evaluation

Provides a full range of features to support learning about dental anatomy, as well as support medical professionals working in the field of Maxillofacial Dentistry to use in medical examination and treatment

Detailed simulation

The anatomical models in the product are designed in detail based on references from slides as well as from real human teeth, thus ensuring accuracy for 3D printing for tooth modeling purposes

Interactions

The VR/AR 3D simulation feature helps users have safe, interesting experiments, closest to the real model.

eCPR

Skills Training System Cardiopulmonary Resuscitation for the Community

In everyday life, when people encounter unusual situations and perform first aid incorrectly, it can make the accident victim more seriously injured

Build an integrated product between hardware and software, between IoT technology and virtual reality to train and form first aid and cardiopulmonary resuscitation skills for people of all ages.

eCPR

Characteristics and architecture

- Support self-exercise with AHA standard procedures
- Combined first aid method: Pressing the heart and blowing air according to the CB procedure
- Respond to results continuously when users interact
- Create practice modules combined with 3D simulation

- The sensor measures depth when performing cardiac compressions
- Determine neck position when performing airway clearance
- Monitor pressure when performing asphyxiation
- Data processing and AI technology integration provide recommendations to practitioners more accurately

- Application of teaching and skills testing at Duy Tan University
- Coordinate with schools, training units, and training hospitals for everyone
- Located at high schools and public locations in Da Nang City

Featured events of eCPR

Teaching

Signing of cooperation

Community training

AED-302

Automatic extra-thoracic cardiogenic shock machine

AED-302 Trainer

Replica of an automatic extra-thoracic defibrillation electroshock machine, without discharge function

Compact design, high battery capacity, short charging time suitable for continuous training.

Completely develop 8 scenarios based on recommendations of the AHA organization in 2020

AED-302

Compact design, waterproof, impact resistant, high durability

Analyze heart rate, make appropriate decisions for each victim's situation

This version is in the experimental phase of measuring energy when performing shock

AED-302

Main function

Accessibility

Voice user guide with clear sound, support multiple languages. User-friendly interface via LCD-TFT display

Design

The lightweight design is easy to move with handles and included handbags that are easy to carry to the scene.

Large easy-to-identify push buttons with clear symbols and striking colors

Analytics

Automatically analyze heart rate and make the correct decision whether electric shock needs to be performed or not, minimizing errors from users

CPR first aid according to CB procedure during waiting time for analytical equipment or after electric shock

Safety

The machine has a light and a signaling sound when ready to operate or when there is an error to help users recognize the machine's condition

Using batteries and accessories that are easy to replace ensures absolute safety for users

DTU-Case

Application Teaching and learning using the PBL method

Tradition

- Linear (based on test), ”one-way road”, rigid
- Students are required to learn what => Students must learn many different issues => Some students make an effort to engage with practice

DTU Case

- Break down scenarios, interact, select different situations for inference training
- Enhance Interaction and Experience-Based Learning
- Development of Analytical and Problem Solving Skills
- Flexibility in Instructional Design

DTU-Case

Application Teaching and learning using the PBL method

Patient Presentation

Bạn là một nhân viên phòng cấp cứu khi Tony Hutchinson, 26 tuổi, được xe cứu thương chở đến trong tình trạng rất khó thở và toàn thân nổi đầy ban. Cô ta đã ăn ở một nhà hàng gần đó, và rồi bị chứng khó thở, giọng khàn khàn và hoa mắt và rồi té xỉu. Cô ta rất hoảng sợ và dường như không hiểu rõ được.

Cô ta nói rằng cô bị phát ban nhẹ sau ăn thức ăn mua ở bên ngoài về và tập thể dục ở cường độ mạnh. Khi còn nhỏ cô bị eczema và vẫn còn những đốm eczema, đôi khi cần phải thoa kem steroid. Cô ta tránh ăn quả hạch.

Huyết áp: 85/50

Mạch: 130 nhịp/phút, đều

Nhịp thở: 26 lần thở/phút

Tony trong tình trạng xấu. Bạn phải suy nghĩ nhanh phải làm gì.

Case Information

Case Toni and Dave Hutchinson (1054)
ID: 35396

Restart Case

Case Pathway

Review your pathway

Case Score

- Tiêm adrenaline vào ngay tĩnh mạch
- Tiêm adrenaline vào cơ và tiêm anti-histamine và hydrocortisone vào tĩnh mạch
- Tiêm adrenaline vào ngay tĩnh mạch, tiêm anti-histamine và hydrocortisone vào tĩnh mạch
- Tiêm adrenaline vào cơ

Một lát sau

Chưa đến 10 giây sau đó Toni bị tim đập nhanh và ngày càng nghiêm trọng, và sau đó thì trở lại trạng thái bất tỉnh. Từ màn hình ECG bạn nhận ra rằng cô ấy bị chứng rối loạn nhịp tim trầm trọng và cố gắng khử rung tim.

Sau một vài lần cố gắng khử rung tim, Toni bị tuyên bố là đã chết.

Trong ví dụ này, bạn có cơ hội được thử lại ….

Case Information

Case: Toni and Dave Hutchinson Tutorial 1 (GMC) (960)
ID: 31736

Restart Case

Case Pathway

Review your pathway

Case Score

Go Back

DTUMind

Active Learning and Lookup System

Concept

With natural language interaction and the power of machine learning, DTUMind intelligently provides information, supporting users in the process of searching, analyzing and deeply understanding specialized content

Meaning

Interactive learning platform, continuously enhanced with machine learning, providing instant feedback and multi-channel support. Custom chatbot systems help optimize time, enhance user experience, and create diverse learning environments, connecting faculty and students effectively

DTUMind

Active Learning and Lookup System

Data
Use subject lectures for training to combine ChatGPT data

\+ =

DTUMind

Outstanding features
Verbal communication, Chatbots expand conversation content

3D printing technology

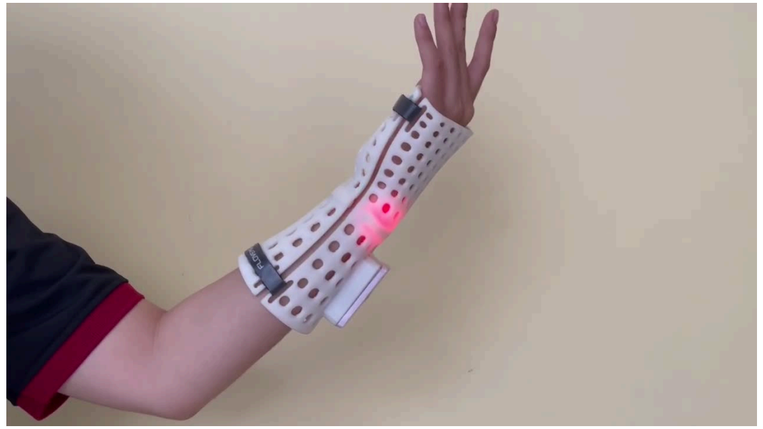
Application of 3 D printing technology in the treatment of trauma and orthopaedics

- Traditional cast method Causes unpleasant sensations due to lack of breathability, easily causing itching and inconvenience to the patient. Accuracy in bone fixation is not high, which can lead to failure to fix the correct position.

- use 3D printing technology to create more custom, precise and comfortable bone braces. Advanced materials such as bioplastics help reduce weight and increase ventilation. Combined with digitalized tracking technology, the treatment process becomes more flexible and effective

3D printing technology

Application of 3 D printing technology in the treatment of trauma and orthopaedics



Features

Using infrared light, nerve irritation reduces pain, quickly heals wounds, and reduces inflammation Minimally limit the influence of factors from outside the environment that hinder injury recovery

Apps

Create bone braces and fixed frames customized to the patient's size and body shape 3D printing of orthopedic shoes or custom shoe soles helps adjust the walking position for people with bone injuries or deformities

SIMCAR

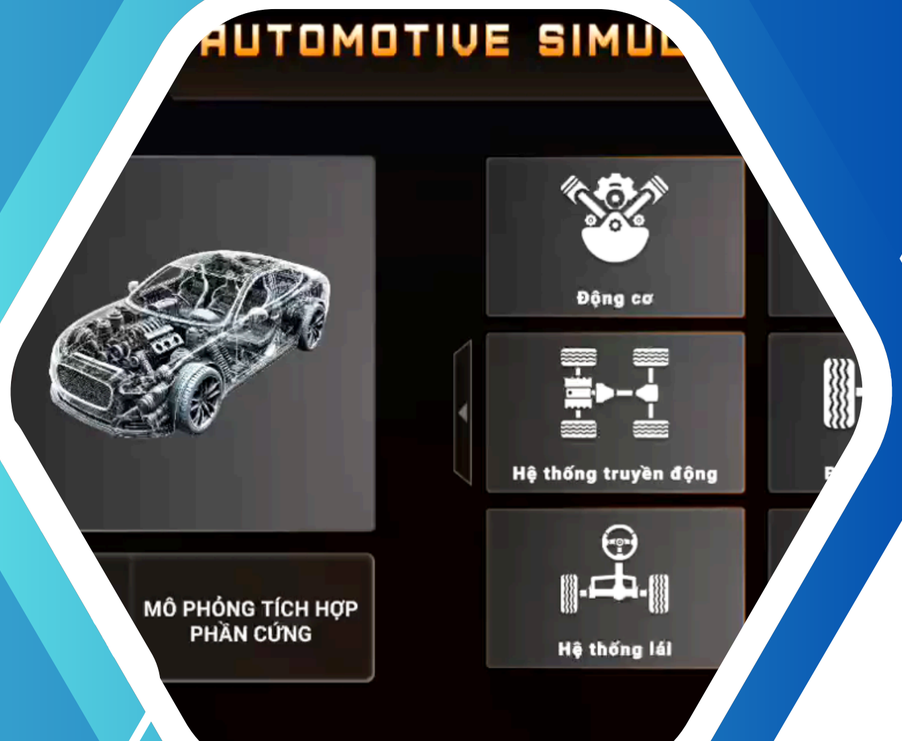
Comprehensive Interactive Simulation System in Smart Car Technical Training

Training in the automotive technology industry is difficult due to the lack of modern equipment and specialized instructors, while automotive technology develops rapidly. Outdated and undigitized lecture equipment makes it difficult for students to access new technology and flexible learning

The software project 3D simulates automobile systems and parts such as engines, gearboxes, braking systems, electrical systems... helps students have an overview and details of the structure and operating principles.

SIMCAR

Comprehensive Interactive Simulation System in Smart Car Technical Training



Detailed simulation

Simulate the entire structure and operation of the car in great detail, helping users to observe each part and system in real operating conditions

VR/AR interaction

Users can use VR/AR to interact directly with car models, practice disassembly, or examine complex details visually and vividly like in the real world.

Hardware integration

IoT systems are integrated into the simulation, providing real-time data on car performance, thereby helping to evaluate performance and detect technical issues early

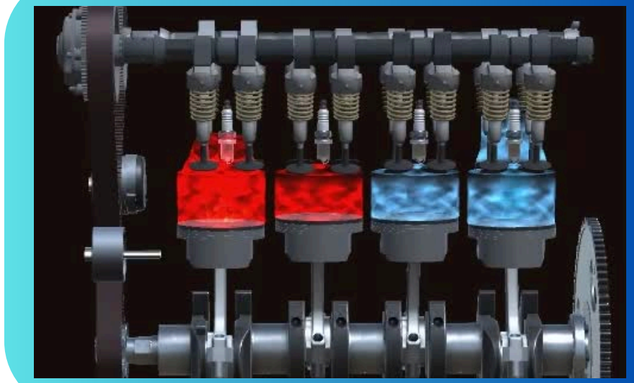
Flexible test learning

Completing virtual reality tests, the simulation cabin includes troubleshooting, maintenance and handling of hazardous situations in the virtual environment

SIMCAR

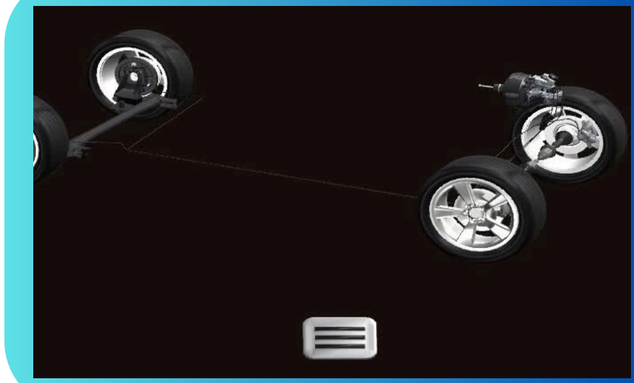
Some 3D simulation videos of the system

Combustion chamber operation



Clutch operation

Foot win operation



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Thank you for listening!

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