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個人手持式自動穴道刺激系統
Personal Handheld Automatic Acupoint Stimulation Systems

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作品摘要

2019年5月聯合國世界衛生組織（WHO）在《國際疾病分類ICD》第11版修訂版的第26章已首度將中醫學（Traditional Chinese Medicine，TCM）納入全球醫學綱要，中醫學已在許多西方國家逐漸受到重視，也越來越多研究學者及臨床醫生紛紛投入相關中醫研究。其中藉由穴道刺激的針灸療效更已有許多研究學者透過科學化的現代醫學方法，有效證實其針灸的療效。針灸是一種「從外治內」的治療方法，其主要是通過經絡、腧穴的作用，並施以針或灸的手法，來達到身體保健和疾病治療之功效，可以起到調和氣血的作用，刺激穴位來調節體內的經脈，讓經脈得到擴張氣血運行更加舒暢，進而調節身體並促使身體恢復健康。

要進行人體穴道刺激，一般主要是以針灸或按摩的手法來實現，然而針灸需要仰賴專業醫師來進行下針的動作，但近年來也有許多因下針錯誤而導致的死亡意外發生，大部分為醫師下針在人體背部穴道時，容易因入穴的角度與深度拿捏不易，反而造成插入肺部的意外發生，亦所謂的肺塌陷（氣胸），佔針灸意外事件約1.5%。除此之外，中國經絡學中已有指出，最有療效的穴道大多落在手肘與膝蓋以下的穴位，主要是經絡的起源都是從該些位置開始，因此該些穴道下針時不僅治療效果最佳，同時下針也相當安全（不必擔心會出現因針灸錯誤而導致的危險發生）。

故本團隊發展一套「個人手持式自動穴道刺激系統」，能依據使用者當前於手機自行輸入之病徵或需求，自動依循雲端所建置之資料庫找尋出相對應之穴道，接著將穴道資訊傳至搭載邊緣AI運算的手持設備，透過影像辨識技術以進行穴位識別與追蹤定位，最後再藉由電動按摩球或自動落針機構，實現穴道刺激之功效，其中本產品實際應用展示如圖一所示。本產品不僅能實現個人化的保健，進而恢復健康外，更可提供專業中醫相關人才培育使用。此外，本產品亦同時考量輕量化設計，相信能更貼近實際個人應用及醫療教學輔具需求。其中圖二為本產品個人手持式自動穴道刺激系統硬體爆炸視圖。

本作品目前已完成四國的發明專利申請，分別為美國、德國、中國與臺灣。除此之外，本作品更成功入選2021年美國消費電子展（CES 2021）臺灣100代表隊之一，並於今年1月完成線上參展。同時更榮獲美國媒體線上聯訪（僅13組團隊），並受國內媒體如民視、新唐人電視、台視採訪，台中日報等媒體採訪。

▲ 圖一 產品實際應用展示

◀ 圖二 產品個人手持式自動穴道刺激系統硬體爆炸視圖

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中興大學電機博士，現為逢甲大學自動控制工程學系副教授與資訊電機學院學士班系主任。曾任工業技術研究院機械所智慧車輛組研究員、經濟部關鍵科專孫項計畫主持人。發展多項先進駕駛輔助系統（ADAS），並成功技轉多家國內車電或 ICT 相關業者。

研究領域

先進駕駛輔助系統、車輛動態與控制、智慧視覺處理、人工智慧、嵌入式系統、中醫科技學
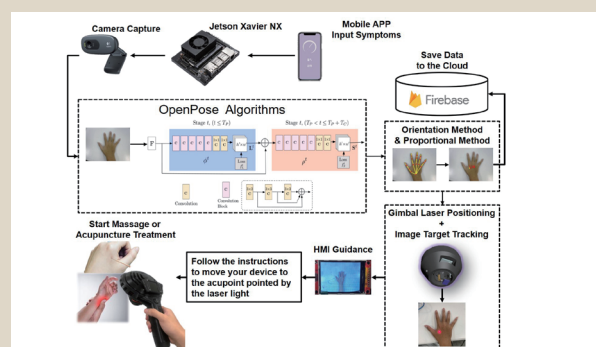
指導
教授

Abstract

In May 2019, the United Nations World Health Organization (WHO) included Traditional Chinese Medicine (TCM) into the Global Medical Outline for the first time in Chapter 26 of the 11th edition of the International Classification of Diseases ICD. Western countries have gradually received attention, and more research scholars and clinicians have invested in related Chinese medicine research. Among them, the curative effect of acupuncture and moxibustion by stimulation of acupoints has been confirmed by many researchers through scientific modern medical methods. Acupuncture is a treatment method that "treats the inside from the outside". It mainly uses meridians, acupoints, and acupuncture or moxibustion to achieve physical health and disease treatment. It can achieve the function of balancing qi, stimulate the acupoints to regulate the meridians in the body, so that the meridians are expanded and the qi is smoother, thereby regulating the body and promoting the body to recovery.

To stimulate the acupoints of the human body, it is usually achieved by acupuncture or massage. However, acupuncture needs to rely on professional doctors to perform the acupuncture action. In recent years, many deaths and accidents have occurred due to incorrect acupuncture, most of it happens when doctors apply acupuncture to acupoints on the back of the human body, the angle and depth of the acupoint are not easy to grasp, which may cause accidental insertion into the lung. The lung collapse (pneumothorax) accounts for about 1.5% of acupuncture accidents. In addition, Chinese meridian studies have pointed out that most of the most effective acupoints fall on the acupoints below the elbow and knee. The origin of the meridian is mainly from these positions. Therefore, the acupoints not only the treatment effect is the best, and the needles are also quite safe (don't worry about the dangers caused by acupuncture errors).

Therefore, our team mainly develops a "Personal Handheld Automatic Acupoint Stimulation Systems". Fig.3 shows this Systems Flowchart. In the beginning, users can input symptoms or acupoint on the mobile APP according to the requirements, and automatically follow the cloud built-in database to find the corresponding acupoint. The information will be transmitted to handheld devices equipped with edge AI computing, acupoint are identified through image recognition technology, use OpenPose Algorithm, and acupoint mathematical models developed by the team, combined with a self-developed laser gimbal for positioning and tracking technology, and the users can follow the HMI guidance prompts to complete the operation. Finally, the effect of acupoint stimulation is achieved through a massage ball or an automatic needle drop mechanism. It can not only achieve personalized health care, and then restore health, but also provide professional Chinese medicine related talents for training and use.

This work has now completed invention patent applications in four countries, United States, Germany, China and Taiwan. In addition, this work was successfully selected as one of the Taiwan 100 teams at the CES 2021, and completed its online exhibition in January this year. At the same time, it was also awarded the online joint interview by the American media (only 13 teams), and was interviewed by domestic media such as FTV, NTDTV, TTV, and Taichung Daily.

▲ Fig. 3 Personal handheld automatic acupoint stimulation systems flowchart