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EMMA: A Robot Therapist to Treat Patients using Acupoint Therapy

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Jul 18, 2016 @ 20:20 | NTU |

A startup incubated by NTU Singapore unveiled a robot therapist- EMMA (Expert Manipulative Massage Automation) to treat patients using acupoint therapy.

If you see a physiotherapist or a Chinese physician for a sprained back, do not be surprised if your therapist turns out to be a robot.

Meet EMMA, unveiled today by a start-up incubated by **Nanyang Technological University (NTU Singapore)**, which has been treating Singapore's national athletes, such as national basketballer and Mediacorp actor Chase Tan.

Short for Expert Manipulative Massage Automation, EMMA is now treating patients at the Singapore Sports Hub, using acupoint therapy to relieve muscle strains and injuries.

Developed by AiTreat, a start-up company founded by **NTU graduate Albert Zhang**, EMMA is undergoing user trials at Kin Teck Tong's Sports Science and Chinese Medicine Clinic at the Kallang Wave Mall.

Mr Zhang, the creator of EMMA, said his creation, a robotic arm with a 3D-printed massage tip that runs on proprietary software, can resolve some of the challenges faced by sports therapy clinics, such as a shortage of trained therapists and a need to deliver high quality therapy consistently.

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"We have designed EMMA as a clinically precise tool that can automatically carry out treatment for patients as prescribed by a physiotherapist or Chinese physician," said Mr Zhang, who graduated in 2010 from NTU's Double Degree programme in Biomedical Sciences and Chinese Medicine.

"This is probably the first such robot in the world developed specifically for use by Traditional Chinese Medicine (TCM) physicians and sports therapists. Our aim is not to replace the therapists who are skilled in sports massage and acupoint therapy, but to improve productivity by enabling one therapist to treat multiple patients with the help of our robots."

EMMA, which has a user-friendly interface and recommended guidelines for various sports injuries, was designed by Mr Zhang based on his experience as a licensed TCM physician in Singapore for the past five years.

The robot consists of a single, 6-axis robotic arm capable of highly articulated movements, a 3D-stereoscopic camera for vision, and a customised, fully rotatable 3D-printed massage tip. Several safety features which work in tandem with advanced pressure sensors are also in-built, to ensure the comfort and the safety of its patients.

Since patient trials started last week at Kin Teck Tong, EMMA has treated 50 patients with different conditions, such as tennis elbows, stiff neck and shoulders, lower back pain, as well as muscle pulls.

Integrating advanced sports science and traditional Chinese medicine, Kin Teck Tong is a modern medical institution with a chain of clinics that offer sports injury rehabilitation and pain management.

Executive Director of Kin Teck Tong, Ms Coco Zhang, said the new physiotherapy robot has the potential to be a disruptive innovation, especially in the TCM and sports science industry.

"Like many developed countries, Singapore has the problem of an aging population. Over the next decade, more people are going to suffer from physical ailments such as arthritis and will be seeking treatment," Ms Zhang said.

"However, as the younger generation prefers knowledge-based jobs rather than physically intensive jobs such as massage therapists, there will likely be a shortage of trained therapists in future. In our trials with the robot, the experience has been very good, as it can perform most treatments as well as our therapists."

Since Kin Teck Tong is the exclusive TCM Partner of the Singapore Athletic Association and Basketball Association of Singapore, delivering high quality therapy is extremely important for the athletes' recovery, Ms Zhang added.

Physiotherapy meets the Cloud

To ensure a consistent quality of therapy, EMMA has sensors and diagnostic functions that will measure the progress of the patient and the exact stiffness of a particular muscle or tendon.

These detailed diagnostics are uploaded to the cloud where the progress of each patient can be analysed and generated into a performance report. For the first time in TCM treatment, patients can accurately measure their recovery progress using precise empirical data.

This is extremely valuable for athletes, as their injuries, treatment and recovery can now be measured and monitored by their physician and therapists. In addition, the treatment programmes can be adjusted according to the progress of the patients' recovery.

AI Treat's propriety cloud intelligence is supported by Microsoft, after Mr Zhang and his teammates won the Microsoft Developer Day Start-up Challenge earlier this year.

Incubated at NTUitive, NTU's innovation and enterprise arm, the one-year-old start-up spent six months developing their first prototype after receiving a grant from SPRING Singapore's Ace Start-up grant.

After the clinical trials are completed, AI Treat will focus on developing its second-generation robot that is more compact and mobile.

"What we have demonstrated is the possibility of having a tireless clinical massage therapist that always delivers high quality treatment," added Mr Zhang.

Chief Executive Officer of NTU Innovation and NTUitive Dr Lim Jui said disruptive innovations like Emma are what the university hopes to achieve by nurturing an entrepreneurial and innovative culture amongst NTU students, graduates and professors.

"We are happy to support one of NTU's promising graduates to turn his dream into reality that will benefit society," Dr Lim said. "We hope to encourage more of our students to follow Albert's footsteps, daring to dream and willing to plunge into uncharted waters to develop future solutions to benefit Singapore and the world."

Image: Start-up incubated by Nanyang Technological University, Singapore unveils prototype robot in trials for sports rehabilitation

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