Research

Associate Professor Ts. Dr. Mohd Hasnun produces intelligent agility training device, enhances badminton players' reaction

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GAMBANG, 1 December 2025 – The difficulty of training agility manually inspired the Director of the Sports Technology Innovation Centre (STIC), Universiti Malaysia Pahang Al-Sultan Abdullah (UMPSA), Associate Professor Ts. Dr. Mohd Hasnun Arif Hassan, who is also the President of the Malaysia Sports Technology Association (MySTA), to produce the Intelligent Agility Training Device, an intelligent agility training device capable of enhancing athlete performance in a data-driven manner.

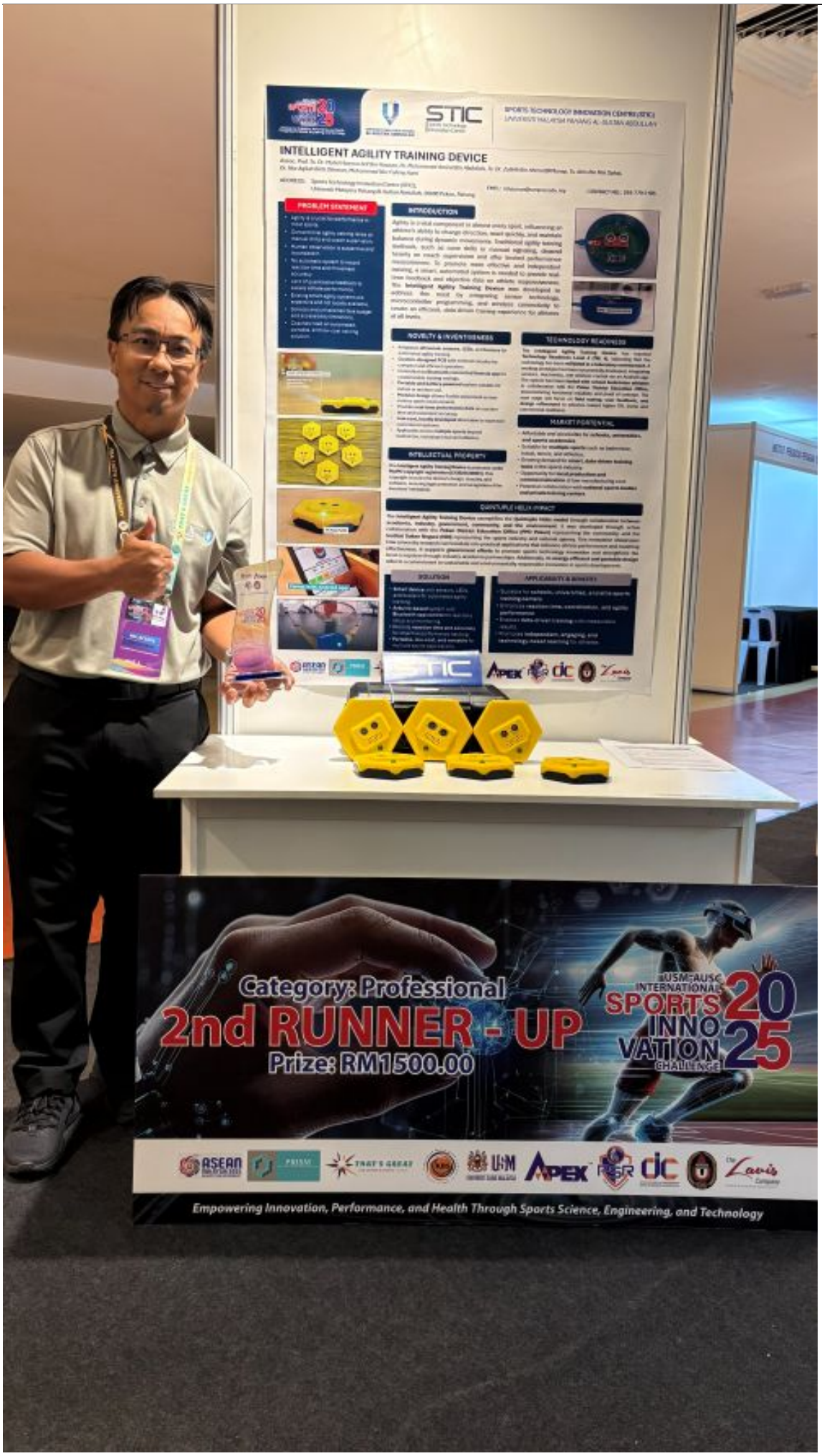
According to Associate Professor Ts. Dr. Mohd Hasnun Arif, the actual need from the badminton team of Sekolah Menengah Kebangsaan Ayer Lanas, Jeli, Kelantan, became the starting point for the development of this device to help enhance the agility training of the school's badminton players.

"Based on that need, this initial idea was then refined through several phases of prototype development before being successfully used in actual training sessions and utilised by the school's badminton team as part of their training programme.

"Conventional training methods still rely entirely on manual instructions from coaches and do not support the recording of performance data; thus, this matter encourages technology-based research to develop more objective and effective solutions," he said.

The development of the Intelligent Agility Training Device was also strengthened through collaboration among researchers from various faculties at UMPSA, namely a lecturer from the Faculty of Manufacturing and Mechatronics Engineering Technology (FTKPM), Dr. Muhammad Amirul Abdullah, and lecturers from the Faculty of Mechanical and Automotive Engineering Technology (FTKMA), Ts. Dr. Zulkifli Ahmad@Manap and Ts. Idris Mat Sahat, a lecturer from the Faculty of Electrical and Electronic Engineering Technology (FTKEE), Dr. Nur Aqilah Othman, as well as FTKEE undergraduate students, Luqman Hakim Amri and Muhammad Nur Fahmy Azmi.

This collaboration ensured that electronic, mechanical, mechatronic, and field-testing aspects could be well integrated to produce a stable device that functions according to athletes' needs.


STIC
INTELLIGENT AGILITY TRAINING DEVICE
Category: Professional
2nd RUNNER - UP
Prize: RM1500.00
USM-AUSC INTERNATIONAL SPORTS INNOVATION CHALLENGE 2025
Empowering Innovation, Performance, and Health Through Sports Science, Engineering, and Technology

He added that research for the Intelligent Agility Training Device began as early as 2018, with the development of the prototype as proof of the basic concept.

“This early version helped the team identify technical requirements, sensor suitability, and stimulation mechanisms that could provide accurate responses to athletes, and in 2020, a second prototype was developed with better detection accuracy, together with improved component durability.

“The third prototype, completed in 2022, was the most stable version at that time, involving the integration of an Android mobile application and more comprehensive system functions for use in actual training sessions.

“Currently, the development of a new generation is being implemented through the use of more responsive sensors and the installation of high-intensity LED rings to ensure visual stimulus clarity aimed at improving reliability, performance, and overall user experience,” he said.

He further explained that the Intelligent Agility Training Device functions by combining electronic components and software to provide random stimuli and automatically record athletes’ reaction time, whereby each device unit is equipped with LED lights and a buzzer as visual and auditory signals, while ultrasonic sensors are used to detect the presence of athletes when they arrive at the target point.

“When training begins, any unit will be activated randomly via the Android application, subsequently forcing the athlete to move quickly towards the signal.

“Reaction time is recorded automatically when the sensor detects the athlete’s presence, making the training more objective and data-driven.

“All units are synchronised via Bluetooth connection, which enables training to be monitored in real time by the coach,” he said.

He added that this research focuses on resolving the main issue in the sports industry, which has long depended on manual training methods without consistent performance data recording.

“The ultimate objective of developing the Intelligent Agility Training Device is to provide an intelligent, portable, data-driven agility training system that is capable of enhancing athlete performance scientifically.

“This device is believed to assist coaches in planning more effective training based on actual performance analysis.

“The use of this device is not only suitable for professional athletes, but also relevant to schools, sports clubs, and training centres due to its lower cost compared to commercial systems in the market,” he said.

External collaboration also played an important role in device testing.

According to him, SMK Ayer Lanas was the first field partner to use the early prototype for the training of their badminton players.

“In addition, the Pekan District Education Office was involved in planning field testing together with

school athletes in the district and this project also received funding through the Lab2Market Grant from the UMPSA Research and Innovation Department, which provided support for prototype development and system improvement.

“The estimated cost of one complete device set consisting of six sensor units is around RM1,500, making it a worthwhile option for educational and training use.

“In planning future direction, we hope that this technology can be developed more widely and utilised by all levels of users,” he said.

He added that future efforts will focus on commercialising a more stable and user-friendly version, expanding usage in schools and training centres, establishing strategic collaborations with sports agencies and the technology industry, and developing advanced analytical features through cloud-based data integration.

“Workshops and training are also planned to enable teachers and coaches to understand the use of this device as a standard training tool in the sports curriculum.

“This device is hoped to become among UMPSA’s significant contributions in leading sports technology innovation in line with modern industry needs.

“It is also relevant to the general public, including schools, sports clubs, and training centres because it offers a cost-effective, user-friendly training solution that can be customised for various types of sports such as badminton, football, and others,” he said.

The Intelligent Agility Training Device has received several awards including the silver medal at CITREX 2022, the silver medal at PECIPTA 2022, the Sports Technology Innovation Award 2022 by the Malaysian Minister of Youth and Sports, and third place in the Sports Innovation Challenge (SIC) – Universiti Sains Malaysia (USM) which was held at SPICE Arena, Penang under the Professional category.

This recognition proves the commercial potential and strength of the innovation developed by his team and UMPSA as a whole.

Besides the Intelligent Agility Training Device, other products that have previously been developed from research in the field of sports technology include the Soccer Ball Launcher, Sepak Takraw Ball Launcher, and Badminton Shuttlecock Shooter.

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