Abstract No: PO-18

Taekwondo head guard and chest guard for training and scoring

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Taekwondo is a highly popular martial art and Olympic sport that has been rapidly gaining worldwide recognition. With its dynamic kicks, precise strikes, and intricate footwork, Taekwondo requires a scoring system that accurately reflects the skill and technique of the participants. However, the traditional manual scoring system, which relies on a team of referees to keep track of points, has its limitations. It can be time-consuming, prone to human errors, and challenging to ensure consistency and fairness in scoring. To address these challenges, the use of electronic scoring systems has become a necessity in Taekwondo competitions. These integrate specialized gear like chest and head guards with advanced sensors. The Electronic Body Protector (EBP) system is crucial in modern Taekwondo, accurately capturing punches, kicks, and rotational kicks. Our solution involves specialized head and chest guards with advanced sensor technology. To detect forces, BMP 180 sensors are used in the chest guard. Positioned within airbags, these sensors detect even slight pressure variations from punches. These sensors, calibrated with precision, exhibit an exceptional capacity to detect even the most suitable pressure variations arising from punches. The calibration process fine-tuned the BMP 180 sensors, orchestrating a responsive mechanism where pressure changes triggered resistance alterations, thereby generating an accurate voltage output. As a result, player punches during matches are swiftly identified and meticulously recorded. Pressure changes trigger the BMP 180 sensor to alter resistance and generate an accurate voltage output. Thus, player punches during matches are swiftly identified and recorded. The chest guard also detects body kicks using BMP 180 sensors, and the head guard recognizes rotational kicks through a gyroscope sensor connected to an ESP 8266 microcontroller. The gyroscope detects angular changes, ensuring accurate rotational kick detection. The ESP 8266 microcontroller processes data from the gyroscope, transmitting it to the scoring system. ESP 8266 microcontrollers with Bluetooth modules facilitate data exchange between guards, ensuring real-time data transfer for reliable scoring. Our design offers a comprehensive scoring solution by combining BMP 180 sensors for punch and kick detection and a gyroscope for rotational kicks. The Scoring Board connects via Wi-Fi to the ESP8266 board, updating scores promptly upon sensor-detected hits. The ESP8266 board calculates hit scores and transmits the data to the Scoring Board, which updates the display in real-time, benefiting players and spectators. Wi-Fi connectivity ensures accurate and swift score updates during competitions. The Scoring Board is vital within the EBP system, enhancing accuracy and fairness. In conclusion, our proposed design offers an economical and accurate framework for punch and kick detection in Taekwondo. This innovation benefits athletes, coaches, and referees, driving the growth of Taekwondo as an exciting sport.

Keywords: Air Bags, Electronic scoring systems, Gyroscope and pressure Sensor, Real-time data transmission, Taekwondo.