

## ABSTRACT

Internet of Things (IoT) is a communication relationship between electronic devices and sensors via the internet that can facilitate human life. One of the IoT devices developed is the Inertial Measurement Unit (IMU) Sensor. Human Pose Estimation (HPE) is an approach developed in IMU to estimate body pose or movement. In the context of walking attitude heading, attitude heading refers to the position of the body in 3D space and the direction in which a person walks or faces. One of the problems with sensor-based HPE is in recognizing the characteristics of human activity estimation due to insufficient training data and data ambiguity that is difficult to overcome. Therefore, this study uses an IMU sensor to recognize the characteristics of human activity estimation, and random forest to classify and predict a person's activity and provide high accuracy and scalability results. The results of this study reveal that random forest can achieve an accuracy level of 61.8% in recognizing running activities, surpassing the 58% accuracy of deep neural networks. However, the accuracy provided is still less than deep learning methods such as BLSTM (84%), CNN (86%), and CNN-LSTM (90%), which achieve higher levels of accuracy. Vision-based human activity estimation provides high accuracy (59%), but still has misclassification in fast walking (64%), and running (59%) compared to sensor-based estimation. The accuracy value of random forest is significantly affected by factors such as training data, data collection method, subject activity, and data processing method.

**Keywords:** internet of things, inertial measurement unit, activity estimation, random forest