

# **Abstract**

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## **A Reliable Gait Analysis Using Fuzzy Logic**

In this paper, an artificial intelligence technique which is fuzzy logic is used as an online prediction of a patient (especially Alzheimer patient) motion status. It depends on the input variables: GPS, GPRS, accelerometer, gyroscope, temperature, heartbeat rate, and the motion status (standing, walking, and running) as an output variable. Fuzzy logic can detect the motion status based on 385 rules for all inputs and output variables. A low-cost smart shoe with embedded positioning tracking is implemented based on sensors and microcontrollers to help Alzheimer patients. The first phase of the experimental work is based on GPS, GPRS, GSM, accelerometer, heartbeat rate sensor, temperature sensor, and a microcontroller, mounted on the shoe side to navigate according to the pedestrian patient movement. All sensors data are collected by the microcontroller and are transmitted to the GSM receiver in SMS message. The GSM module is connected to the PC via a USB serial port. Transmitting data is periodically sent upon a specific time. The detected data is stored in the database as a function of time. The data includes the position of the patient (latitude and longitude) located on the Google map software, health status (heartbeat rate), gyroscope and accelerometer (x, y, z) of movement as a function of time.