

عنوان مقاله:

IoT Raspberry Pi Based Smart Parking System with Weighted K-Nearest Neighbours Approach

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نویسندگان:

Md Shohel Sayeed

Huzafah Abdulrahim

Siti Fatimah Abdul Razak

Umar Ali Bukar

Sumendra Yogarayan

خلاصه مقاله:

Due to the limited availability of parking slots in parking areas, drivers often have difficulty finding an empty parking slot. The number of parking slots available at a particular location is usually less than the number of vehicles. Hence, drivers spend a lot of time looking for vacant parking slots, which eventually delays the completion of their tasks, such as paying bills, attending a meeting, or visiting a patient at the hospital, etc. There are a couple of parking guidance systems that have been highlighted by the other researchers, but most of them lack real-time, convenient guidance. This research proposed a smart parking guidance system made of an IoT Raspberry Pi combined with an Android application that makes use of the weighted k nearest neighbours for positioning the vehicle. This was achieved through the use of Wi-Fi signal strength indicator fingerprinting, allowing for real-time navigation and parking detection. In order to achieve real-time parking over the internet, Raspberry Pi hardware and the ThingSpeak IoT cloud with ultrasonic sensors are used in the proposed method. An Android application was involved in this parking detection system, which adopted IoT approaches to estimate the location of users in real-time and provide routes using route-finding techniques to assist drivers in finding their desired parking slots. Data from the sensors was processed and translated into the Raspberry Pi using the Python programming language. They were sent using the Message Telemetry Transport protocol to send parking data to the ThingSpeak IoT cloud in real-time. This data was displayed via the Android app. The user is then able to view each available parking slot, acquire the route, and be directed with high accuracy to the parking slots of their choice. In this study, advanced sensing and communication technologies were used together with the weighted k nearest neighbours algorithm for positioning and wayfinding in order to improve parking guidance accuracy. Based on the experimental results, the proposed system showed a lower average error rate of ۱.۵ metres in comparison to other positioning techniques, such as GPS, or other similar algorithms for positioning, such as maximum a posteriori, which have shown average errors of ۲.۳ metres and ۳.۵۵ metres, respectively, a potential increase of more than ۳۵% from the previous error rate. Doi: ۱۰.۲۸۹۹۱/CEJ-۲۰۲۳-۰۹-۰۸-۰۱۲ Full Text:

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کلمات کلیدی:

.Smart Parking; IoT; WKNN; Parking Guidance; Raspberry Pi; Positioning System

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