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A Vehicle Monitoring System Based on the LoRa Technique

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Abstract : Air pollution and climate warming become more and more intensified in many areas, especially in urban areas. Environmental parameters are critical information to air pollution and weather monitoring. Thus, it is necessary to develop a suitable air pollution and weather monitoring system for urban areas. In this study, a vehicle monitoring system (VMS) based on the IoT technique is developed. Cars are selected as the research tool because it can reach a greater number of streets to collect data. The VMS can monitor different environmental parameters, including ambient temperature and humidity, and air quality parameters, including PM2.5, NO₂, CO, and O₃. The VMS can provide other information, including GPS signals and the vibration information through driving a car on the street. Different sensor modules are used to measure the parameters and collect the measured data and transmit them to a cloud server through the LoRa protocol. A user interface is used to show the sensing data storing at the cloud server. To examine the performance of the system, a researcher drove a Nissan x-trail 1998 to the area close to the Da’an District office in Taipei to collect monitoring data. The collected data are instantly shown on the user interface. The four kinds of information are provided by the interface: GPS positions, weather parameters, vehicle information, and air quality information. With the VMS, users can obtain the information regarding air quality and weather conditions when they drive their car to an urban area. Also, government agencies can make decisions on traffic planning based on the information provided by the proposed VMS.

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