

# SISTEM ZA PRAĆENJE KONCENTRACIJE PM2.5 ČESTICA BAZIRAN NA ARDUINO PLATFORMI I GIS

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## Abstrakt

Broj stanovnika u urbanim zonama se konstantno povećava što, u kombinaciji sa drugim faktorima, dovodi do pogoršanja kvaliteta vazduha. Jedan od najvažnijih parametara koji se meri u okviru monitoringa kvaliteta vazduha je koncentracija finih čestica (PM – particulate matter). One su povezane sa mnogim zdravstvenim problemima, na primer oboljenjima srca i pluća. U ovom radu predstavljamo prototip senzorskog sistema za praćenje koncentracije PM2.5 čestica, baziran na Arduino platformi. Sistem se sastoji od više senzora (senzor koncentracije PM2.5 čestica, senzor temperature i vlažnosti vazduha, senzor koncentracije ugljen-monoksida, itd), koji su povezani na Arduino Uno R3 pločicu sa Atmega328P mikrokontrolerom. Testiranje sistema je izvršeno u trajanju od deset uzastopnih dana, pri čemu su svakog dana merenja izvođena na šest lokacija. Pored senzora kvaliteta vazduha sistem je opremljen i GPS prijemnikom, te su dobijeni podaci bili georeferencirani. Oni su potom korišćeni za generisanje rasterskih mapa u GIS okruženju, kako bi se kvalitetnije vizuelno predstavila prostorna raspodela merenih parametara. Primenjeni pristup, iako sa određenim nedostacima, predstavlja dobru osnovu za GIS-bazirani sistem za permanentni monitoring kvaliteta vazduha.

**Ključne reči:** praćenje kvaliteta vazduha, Arduino, GIS, mikrokontroler, sistem za monitoring

## GIS AND ARUDINO BASED MONITORING SYSTEM FOR PM2.5 PARTICLES

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### Abstract

Population in urban areas is constantly increasing which, in combination with other factors, leads to degradation of air quality. One of the most important parameters that has to be measured in air quality monitoring is concentration of fine particles (PM – particulate matter). They are linked with various health hazards, such as heart and lung diseases. In this paper we are presenting a prototype of a sensor system for monitoring of PM2.5 particles, based on Arduino platform. The system consists of several sensors (PM2.5 concentration sensor, air temperature and humidity sensor, carbon-monoxide sensor, etc.), that are connected to Arduino Uno R3 evaluation board with ATmega328P microcontroller. The system was tested during ten consecutive days. Each day the measurements were performed on six location. Besides air quality sensors, the system is equipped with GPS sensor too, so collected data are georeferenced. They were used to create raster maps in GIS environment, in order to better visualize the spatial distribution of pollutants. Applied approach, although with some drawbacks, appeared to be a good basis for a GIS based system for permanent air-quality monitoring.

**Keywords:** air-quality monitoring, Arduino, GIS, microcontroller, monitoring system