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# Indoor monitoring of respiratory distress triggering factors using a wireless sensing network and a smart phone

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O. Postolache ; P. Girao ; M. Dias Pereira ; G. Ferraria ; N. Barroso ; G. Postolache All Authors

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#### Metadata

**Abstract:** A wireless sensing network Bluetooth enabled was designed and implemented for continuous monitoring of indoor humidity and temperature conditions as well as to detect pollutant gases and vapors. The novelty of the work is related to the development of an embedded software using Java2ME technology for a smart phone that materializes a user friendly HMI. Two mobile software modules assure sensor nodes data reading through Bluetooth connection, primary data processing, data storage and alarm generation according with imposed thresholds for air quality parameters. Additional .NET developed software for a Notebook PC platform permits to remotely configure the mobile application and to receive the data logged in the mobile phone. Using the implemented distributed measurement system, including the smart phone, an intelligent assessment of air conditions for risk factor reduction of asthma or chronic obstructive pulmonary disease is carried out. Several experimental results are also included.

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## Contents

### I. Introduction

Respiratory distress is the second most common symptom of adults transported by ambulance and is associated with a relatively high overall mortality before hospital discharge of 18% [1]. Among the most common causes of respiratory distress in this setting are congestive heart failure, pneumonia, chronic obstructive pulmonary disease and asthma [1]. It is projected that chronic obstructive pulmonary disease (COPD) to be the third leading cause of death worldwide by 2020 due to an increase in smoking rates and demographic changes in many countries [2], [3]. Worldwide some 300 million people currently suffer from asthma. It is the most common chronic disease among children [4]. The economic burden of COPD in the US in 2007 was 42.6 billion in health care costs and lost productivity [5]. The environmental factors acting during early life and interacting with specific "asthma genes" are crucial for the development of chronic, persistent form of disease [6]. One of the factors associated with etiology of chronic obstructive pulmonary disease and asthma is the indoor air pollution. The identification of the indoor air associated with pathophysiology of COPD and asthma disease will thus be crucial to the primary prevention strategy. Poor indoor air quality is becoming an increasing problem around the world because, in general, people are spending more time indoors. This problem is greater in infants who now spend less time playing outside. Reduction of indoor air quality - produced by mould growth, smoke exposure, cooking fire smoke (often using biomass fuels such as wood and animal dung), house dust mites in bedding, carpets and stuffed furniture, chemical irritants (i.e. perfumes), pet dander - may adversely affect the health of building occupants and exacerbate asthma and COPD attacks. Asthma attacks are mainly related to mould growth that is enabled by relative humidity high values for different temperature conditions. Mould spores, bacteria, and mildew thrive in dampened towels, washcloths, and moist or humid areas. Additionally, people with immune or respiratory system problems may more easily succumb to poor health caused by mould growth at home, which is mainly associated with humidity and temperature values. Improved heating systems and less ventilation from outside has also provided more suitable conditions for mould growth.

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