

# Smart Bin - An Odor Oriented Approach

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## ABSTRACT

Technology enhanced trash cans have already been subject to research and have become available as market products. How we handle the waste has traditionally been a logistics issue, but it can be approached also in other ways. The SmartBin perceives the trash as something more than a pile of waste - it is also something smelly! The emphasis is on improving the indoor environment to ultimately improve the quality of life by detecting odors. The technology enhancing the bin uses sensors which detect gas emissions, mainly the ones occurring in decomposition of organic materials. If any of these values exceed the threshold the SmartBin will react accordingly, supported by state of the art machine learning techniques. Any specifics will be listed in the following document. This will range from hardware prototyping to evaluation of the product.

## ACM Classification Keywords

H.5.m. Pervasive computing, smart measuring: Miscellaneous

## General Terms

Design; Measurement.

## INTRODUCTION

### RELATED WORK

This is not the first paper about Smart Waste Management Systems (WMS). Other researches explored interesting IoT approaches to the problem, mostly in relation to planning garbage collection and / or waste reduction. ...many, pick one or two... like in Australia, France implemented an RFID and weight based approach for a real time automated WMS, with the main focus on bringing down management costs and facilitate automating waste identification. citation to korean guys In another study from South Korea, the main approach was to identify food waste in a selected area of Seoul and give citizens incentive to waste less food by fining them based on the amounts of waste they dispose. The infrastructure is similar to other systems, with a centralized server and a host of devices providing data to this server. Then the server provides data for applications such as management utilities or phone apps. cite catania In another study, Vincenzo Catania and his colleagues used a Smart-M3 Platform and sensor enhanced

bins in Catania, Italy with the main focus on urban planning, smart collection and monitoring of urban solid waste. In this case, the information that was collected was on the location of the trash can, level of fullness, and weight of the waste.

## SYSTEM DESIGN

In this section we describe the overall system characteristics proposed for our approach to waste management. The system is composed of two main components:

- sensory layer: responsible of producing information.
- information layer: responsible of collecting and presenting information.

### sensory layer

Our approach relies on two kinds of information related to the state of the bin: smell and fill level. For this reason, the sensory part of the system is of key importance, since it enables the information to be perceived and registered by the system. An odor detection sensor is able to capture volatile organic compounds (VOCs) and other gases, typical bioproducts of food decomposition, commonly associated with bad smell. Some examples are Hydrogen Sulphide, Ammonia, Toluene and others. When the presence of one of these gases exceeds a given boundary, the sensor will report bad smell. The second sensor will be placed on the top of the trash can, in order to measure the distance to the trash level and report about fullness.

### information layer

Having obtained the information is only the first step though, the next one is to make it available. Our system uses a web service for collecting the data and storing it in a database, making it accessible to potential consumers.

## HARDWARE ARCHITECTURE

## SOFTWARE ARCHITECTURE

## EVALUATION IN SMELLY ENVIRONMENTS

## CONCLUSION