

# Design and fabrication of an automatic classifying smart trash bin based on Internet of Things

Bo Sun<sup>1</sup>, Quanjin Ma<sup>1,2</sup>, Guangxu Zhu<sup>1</sup>, Hao Yao<sup>1</sup>, Zidong Yang<sup>1</sup>,  
Da Peng<sup>1</sup> and M.R.M. Rejab<sup>1,2</sup>

<sup>1</sup>*School of Mechanical Engineering, Ningxia University, Yinchuan, China,* <sup>2</sup>*Structural Performance Materials Engineering (SUPREME) Focus Group, Faculty of Mechanical & Automotive Engineering Technology, Universiti Malaysia Pahang, Pekan, Malaysia*

## Introduction

Municipal solid waste (MSW) refers to the materials discarded, including commercial wastes, collected and disposed of by the municipalities (Guerrero, Maas, & Hogland, 2013). With rapid economic growth and massive urbanization, municipal solid waste is the major challenge to recover and recycle as alternative renewable energy (Cheng & Hu, 2010). According to Allied Market Research, Portland, Oregon, waste management worldwide is expected to grow at an annual rate of 6.2% by 2023, with more significant growth in the emerging Asia Pacific region. In Europe, this sector grew by more than 30% in 2016 and growth is expected to continue to accelerate due to the presence of advanced infrastructure and the high demand of several interested sectors (Pardini et al., 2019). Moreover, the quantity of MSW generation in 214 large and medium-sized Chinese cities was 188.51 million tons in 2016 (Yang et al., 2018). With the increasing amount of wasted material, there is an urgent demand for trash garbage with classification and recycling functions (Dahlén & Lagerkvist, 2010). Due to the lack of relevant infrastructure and facilities, garbage classification and recycling have large potential application fields.

The conventional trash bins adopt the concept of foot stepping, hand lifting or opening, as illustrated in Fig. 17.1. The garbage could not be effectively be classified, and does not have several functions. The garbage becomes moldy and stinky, such as various bacteria and flies. These not only lead to it not being convenient and opening the lids with hands, but also