

Smart Waste Management System for Metropolitan Cities

Literature Survey

1. Adapting food supply chains in Smart Cities to address the impacts of COVID19 a case study from Guadalajara metropolitan area

B. Baena et al., "Adapting food supply chains in Smart Cities to address the impacts of COVID19 a case study from Guadalajara metropolitan area," *2020 IEEE International Smart Cities Conference (ISC2)*. This article focuses on the food supply chain and aligns with the United Nations Sustainable Development Goal of Zero Hunger. They are looking to avoid food waste where Smart Cities must work. Food waste requires innovation with technology to change consumer's behaviors, efficient supply chain management, and innovative food production systems not to harm the environment. Among the economic impact, water and carbon footprint affects vital performance indicators into a Smart City. Hence, this work considers water and carbon footprint, as well as economic impact. We contribute to the Smart Cities, providing a multi-Agent simulation able to be scaled with an ontology with the purpose to plot different scenarios to stakeholders in a Smart City and help to avoid food waste situations. To simplify the simulation, as preliminary work, we used a typical food in Guadalajara Metropolitan Area, which is a Taco. The model covers a community in the Zapopan Municipality, where a developed urban study is the first proof of the system's concept. Furthermore, based on the simulation scenarios fed with real, local data, we discussed how we can integrate this multi-agent platform to face COVID-19. Finally, we want to help family businesses on the food supply chain using information technologies and applying digital processes to better adapt to new operation rules since COVID-19 to fight food waste since COVID-19.

2. Deep Learning based Smart Garbage Classifier for Effective Waste Management

S. R., R. P., V. S., K. R. and G. M., "Deep Learning based Smart Garbagem Classifier for Effective Waste Management," *2020 5th International Conference on Communication and Electronics Systems (ICCES)*. India is the second most populated country in the world and it is still facing hindrances to its development on waste management. It is believed that 10 million tons of waste is produced just by the metropolitan cities in India. In this work, a way to classify the waste and find the category of it is proposed with a well-defined and labelled data set of images consisting of categories (plastic, paper, cardboard, metals) using Convolutional Neural Network (CNN). Images are categorized based on their properties by the help of a self-learning neural network. The designed classifier learns from the image data provided for training purpose. The classifier uses the method of supervised learning where the algorithm learns from a labelled data set. With this method a testing accuracy of 76% is achieved.

3. Smart waste management using Internet of Things: A survey

K. N. Fallavi, V. R. Kumar and B. M. Chaithra, "Smart waste management using Internet of Things: A survey," *2017 International Conference on I-SMAC (IoT in Social, Mobile, Analytics and Cloud) (I-SMAC)*. At present solid waste management is a major concern in the metropolitan cities of the developing and developed countries. As the population is growing, the garbage is also increasing. This huge unmanaged accumulation of garbage is polluting the environment, spoiling the beauty of the area and also leading to the health hazard. In this era of Internet, IOT (Internet of Things) can be used effectively to manage this solid waste. In this paper, we have discussed the definition of Internet of Things and its elements, testing and prototyping tool cooja simulator and finally the study of various literatures available on smart waste management system using IOT.

4. Internet of Things based Intelligent Waste Segregation and Management System for Smart Home Application

M. Bhuvaneswari, K. Tansin, S. T. Ahamed, N. T. Sri Ram and S. V. Prasath, "Internet of Things based Intelligent Waste Segregation and Management System for Smart Home Application," *2022 7th International Conference on Communication and Electronics Systems (ICCES)*. The Internet of Things (IoT) has a significant impact on research for real time data monitoring. Waste segregation and control based on IoT is a significant task in metropolitan cities and municipal corporations. The advancement of key enabling technologies dependent on IoT enabled devices. Waste segregation and disposal mechanisms are among the severe problems associated with smart cities, which have a negative impact on our society and health. The trash bin monitoring and control is carried out through a microcontroller is proposed in this work. An IoT enabled smart bin utilizes a microcontroller with multiple sensors will control the process. In this paper, use inductive proximity sensors to detect metal trash, while temperature and humidity sensors are used to segregate as wet and organic wastes. The bin filling level is monitored using Infrared sensors. IoT with sensor communication module allows remote control of real-time data collection at each home. While Bluetooth allows for short-range waste monitoring via a mobile app. Waste is piled at various levels in the trash bins. The centralized controller is enabled and the filled bins are managed effectively with the deep learning technique. The waste collection is monitored by setting up a training model based on Deep Learning (DL). The intelligent GUI will track the unfilled levels of each trash bin as proposed.

5. Solid Waste Management Models: Literature Review

N. P. Adriyanti, A. Gamal and O. C. Dewi, "Solid Waste Management Models: Literature Review," *2018 2nd International Conference on Smart Grid and Smart Cities (ICSGSC)*. Waste has always been a serious problem, not only to the environment but also to the economic and social aspect. Solid waste management models are created to solve waste problems in different aspects and areas. Many models were made to tackle waste problems in cities or metropolitan areas. Yet, there are no specific solid waste management models that are made specifically for villages that undergo a transition to a city and it is affecting both natural and social environment in the area. A literature study was done to see which existing model could be applied to Indonesia's transitioning

villages through the lenses of sustainable urban planning by reviewing ten existing models. The conclusion from the literature study is that solid waste management model needs to emphasize (1) the participation of local communities, (2) the pattern of waste transport and the type of waste management that does not require a large financial burden, (3) management infrastructure that can be made / held by the community / local organizations.