

East Tennessee State University

Digital Commons @ East Tennessee State University

Appalachian Student Research Forum

2018 ASRF Schedule

Apr 5th, 8:00 AM - 12:00 PM

THE ECO-SMART CAN V2.0

Darack B. Nanto

East Tennessee State University

Follow this and additional works at: <https://dc.etsu.edu/asrf>



Part of the [Electronic Devices and Semiconductor Manufacturing Commons](#), [Industrial Technology Commons](#), and the [Other Engineering Commons](#)

Nanto, Darack B., "THE ECO-SMART CAN V2.0" (2018). *Appalachian Student Research Forum*. 39.
<https://dc.etsu.edu/asrf/2018/schedule/39>

This Oral Presentation is brought to you for free and open access by the Events at Digital Commons @ East Tennessee State University. It has been accepted for inclusion in Appalachian Student Research Forum by an authorized administrator of Digital Commons @ East Tennessee State University. For more information, please contact digilib@etsu.edu.



THE ECO-SMART CAN V 2.0

Author: Darack Nanto

Committee: Dr. Paul Sims, Dr. Keith Johnson, Dr. Moin Uddin

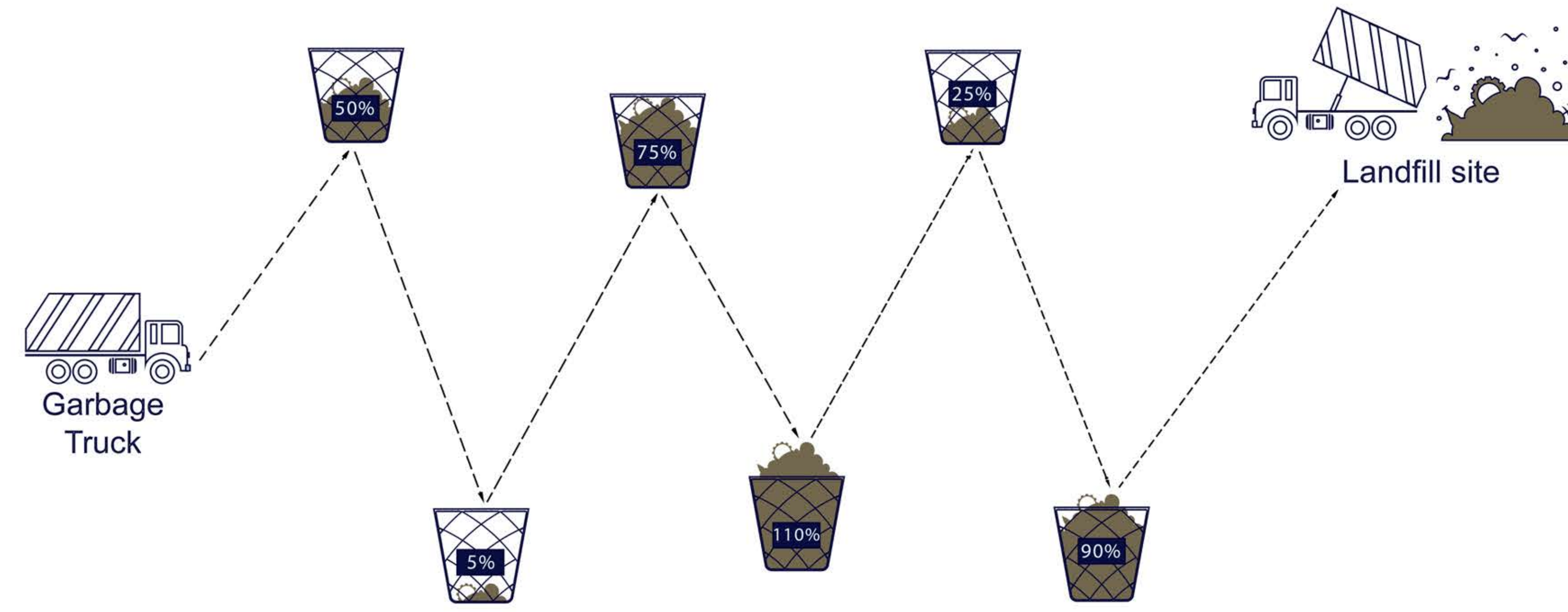
ETSU Department of Engineering Technology, Surveying and Digital Media



ABSTRACT

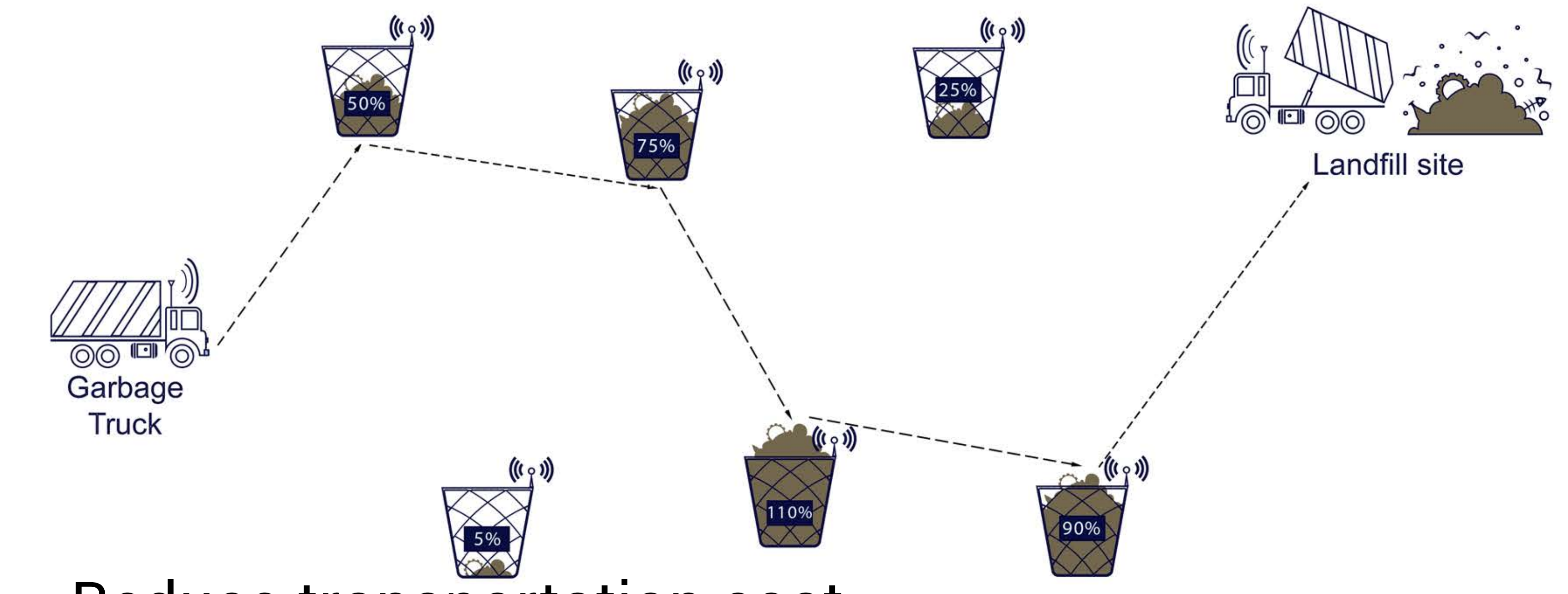
I noticed that the workers had the same itinerary when emptying trashcans, meanwhile trashcans needed urgently to be emptied. Traditionally, ETSU maintenance operate on daily routes to pick trash on designated time, regardless the level of the containers. This leads to overflowed trashcan in busy areas or during rush hours in certain areas. This overflowed trashcan result in an unclean environment for the community and an unpleasant look of our beautiful campus. The time, resources and labor invested in collecting the trash could be saved. Therefore, I decided to use the Internet of Things (IoT) to create a device that will optimize trash collection, to reduce costs and pollution. The Eco-Smart Can will contain a renewable source of energy such as the solar panel. Furthermore, it will have a compactor as well to decrease the trash volume. The system in the Eco-Smart can will require to give prior information of the trash level to maintenance facility so that they can empty the trash in a timely manner and preserve the environment.

UNOPTIMIZED ROUTE



- Inefficient
- Loss of fossil fuel
- Loss of Time

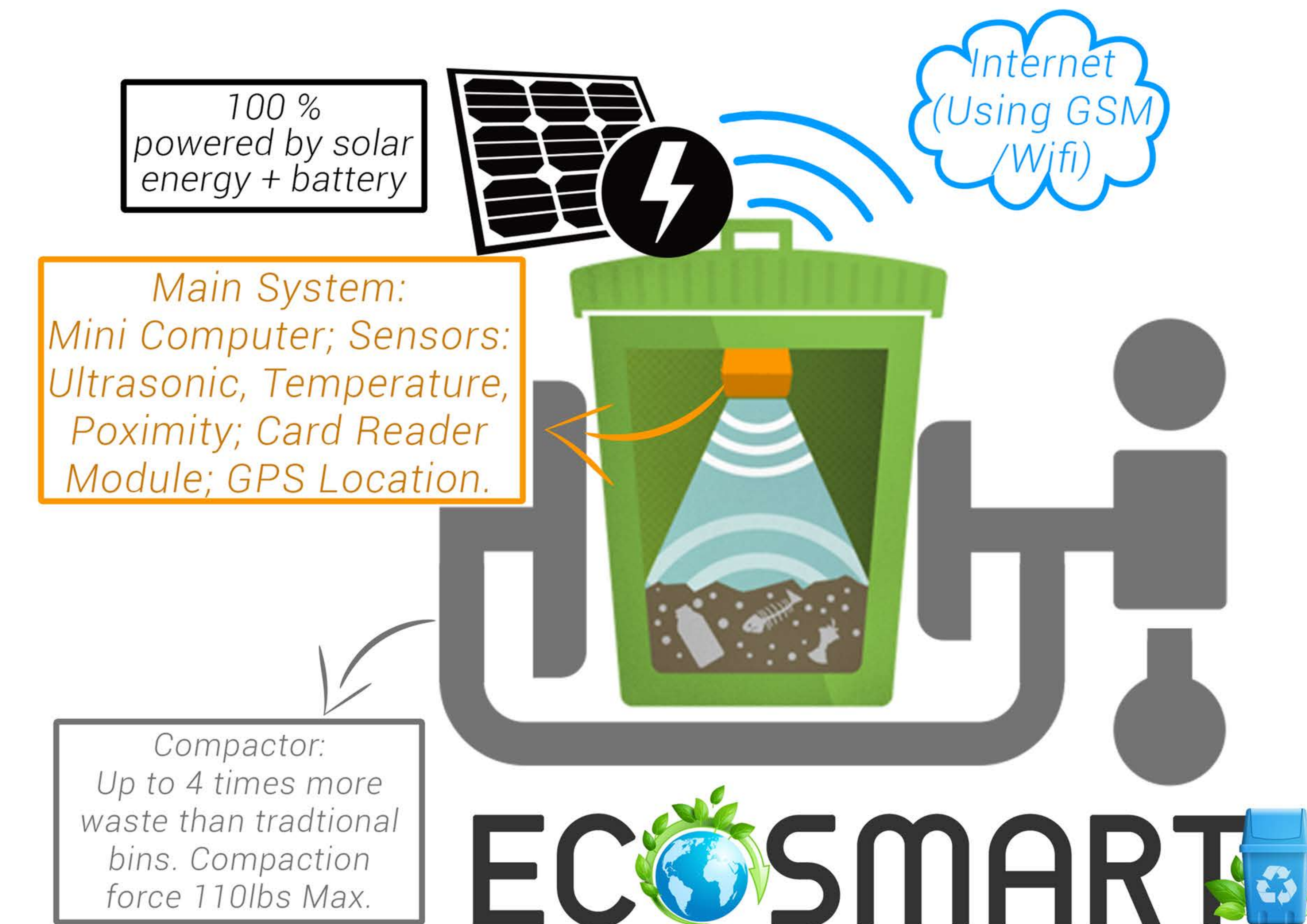
OPTIMIZED ROUTE



- Reduce transportation cost
- Reduce Fossil fuel cost
- Labor is decrease
- Will reduce campus waste management by up to 20%
- Efficient trash collection, better route planning
- Data can help predict when a trash will get filled
- Keeps the environment cleaner.

IoT PROPOSED SYSTEM

The IoT is the concept of connecting any device or man-made object to the internet. It provides the ability to transfer data over the internet. My project, "The Eco-Smart Can V2.0", aims at using the same concept of the IoT and connecting a built device using an open-source computer and software to send data from a traditional trash container to the maintenance facility office.



CONCLUSION

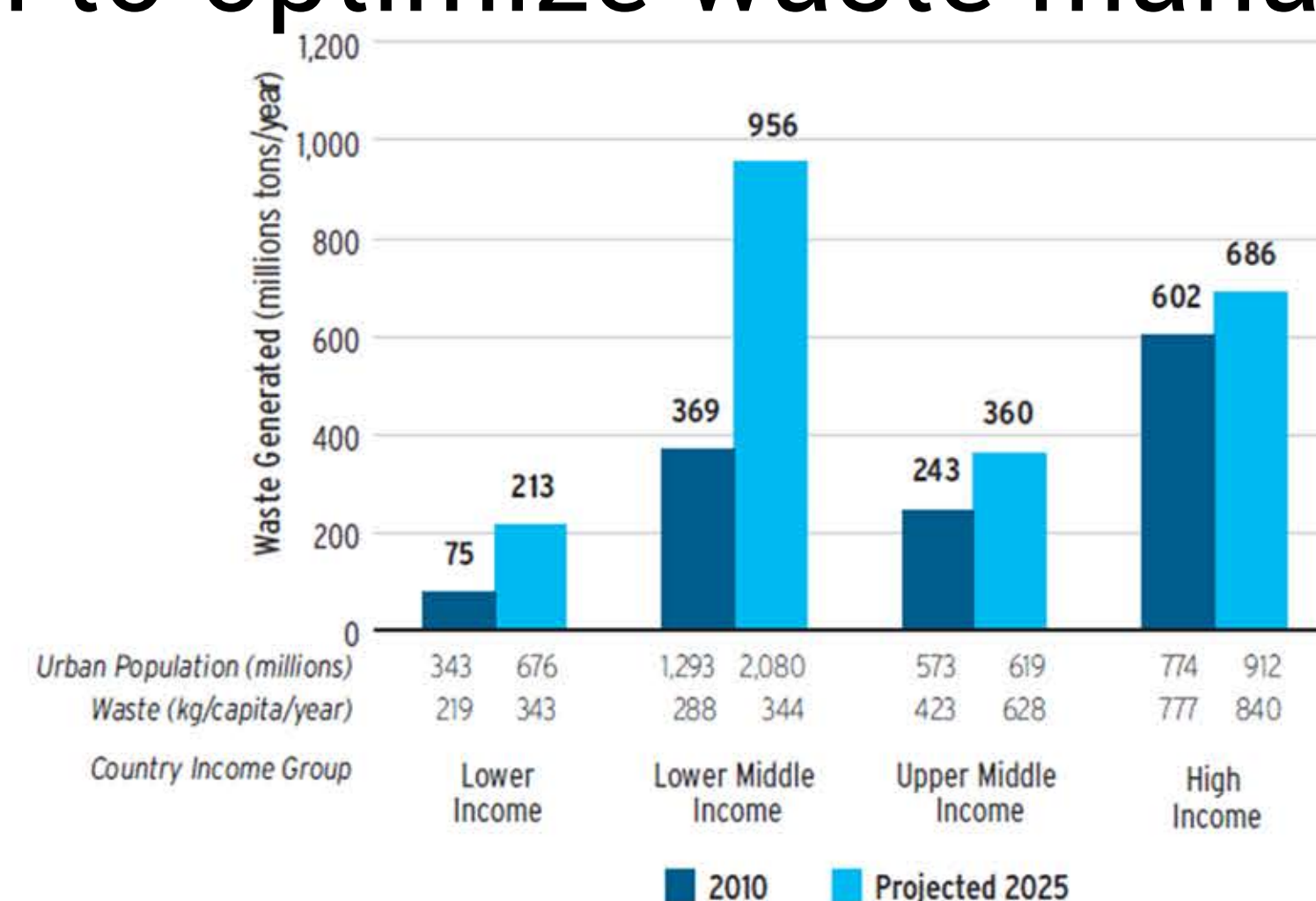
This device will be useful to the ETSUs maintenance facility or any other sanitary institution with the aim to optimize waste management. In addition, workers will know which trash containers to prioritize and would accordingly make plans to use the best route. My work is a small but an efficient step towards cleanliness and I believe that this research will encourage more people to do further great research on the similar topics. I have successfully made and tested the model of an Eco-Smart Can, so I believe with encouragement from the government, investors, and ETSU I can successfully transform this model into a product.

REFERENCES

- Hoornweg, D., & Bhada-Tata, P. (2012, March). *What a Waste: A Global Review of Solid Waste Management*. Retrieved from The World Bank: https://siteresources.worldbank.org/INTURBANDEVELOPMENT/Resources/336387-1334852610766/Wha_t_a_Waste2012_Final.pdf
- Ecube Labs. (2011). Retrieved from Ecube Labs: <https://www.ecubelabs.com/>
- World Bank. (2013, October 03). *Global Waste on Pace to Triple by 2100*. Retrieved from <http://www.worldbank.org/en/news/feature/2013/10/30/global-waste-on-pace-to-triple>
- Nanto, D. (2016, December). *The Eco-Smart Can*. Retrieved from <https://dc.etsu.edu/honors/363>

INTRODUCTION

The world population is growing so is the trash production; an average American throws his or her body weight in trash every month. The World Bank reported a rise of trash daily production to more than 3.5 million tons in 2010 (World Bank, 2013). It is reported that the world trash collection expenditure will increase by 83% in year 2025, it is predicted to a sharp increase from \$205 billion in 2010 to \$375 billion by 2025 (Hoornweg & Bhada-Tata, 2012) as seen in the below graph. Many cities in the United States like Boston, New York, Pasadena, Baltimore, San Francisco, Santa Clarita (California) are taking positive initiative to combat the fast-growing trash production with the Internet of Things (IoT) (Shueh, 2016). This research will create an affordable smart trash can called the "Eco-Smart Can V2.0" for my campus application with low cost embedded component using the IoT based waste management system. With the main aim to optimize waste management cost.



Urban Waste Generation by Income Level and Year