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Waste Segregation System Using IR Sensor and Arduino Controller

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ABSTRACT: The amount of waste in India increases with population and urban size. It is effective in reducing air pollution in the environment. The biggest goal of the project is to separate all kinds of waste from garbage. India's waste generation is 0.6 kg of waste per person per day. There is a very high amount of waste per capita in India. Illegal dumping can cause atmospheric degradation problems. Garbage is thrown in various dumps all over India. Waste is not recycled, combined or otherwise processed in the environment. Waste is not recycled, combined or otherwise processed in the environment. The city should ensure that biodegradable waste is separated from non-biodegradable waste. After that, biodegradable waste will be produced. Plastic, metal, paper and other waste can also be recycled. In some ways in which, the waste will really function a resource.

KEYWORDS: Segregation, Recycling, Smart waste management**, **,IR sensor, biodegradable.

I.INTRODUCTION

Currently India is facing the biggest challenge related to waste which is poor collection, transportation, processing and disposal of waste. India's current system is unable to handle the huge amount of waste generated by its growing urban population, affecting the environment and public health. Currently, poor waste management and disposal has a negative impact on public health, the environment and the economy. Waste management generally includes all activities for waste management, from collection to disposal. It processes all types of waste, including industrial, biological and household waste. Waste management aims to reduce the negative effects of waste on human health, environment or beauty. Waste separation is done on site, which helps facilitate recycling. India is in a critical situation when it comes to the waste generated by its growing urban population. Almost all developed and developing countries still face this challenge. For this reason, the first image input of the waste sorting model system's phone from the pi camera is determined according to the data produced in the hear cascade, and when the person is detected, Metal ARM takes the items and places them in the same place.

II.RELATED WORKS

The concept of waste segregation is introduced by Santhosh Kumar B R et. al [2017]. In recent years collection and segregation of waste is the major challenge faced by all metropolitan cities worldwide, this is due to the rapid increase in population, industrialization and urbanization. The main objective of this paper is effective and efficient methods of waste collection and segregation at domestic level based on their nature of composition i.e. metal, plastic and biodegradable, the waste is stored accordingly in their respective segments of the dustbin. Using current technology and user friendly approach we aim for waste segregation at the source level. A segregation model was designed which segregates waste into metallic, wet and dry waste, A microcontroller based embedded system was designed, which uses DC motor for conveyor belt and segregates wastes into three categories metal, dry and wet waste using simple techniques. The main objective of this paper is segregation of wastes i.e. biodegradable, metal and plastic. The above proposed approach eases the segregation of wastes at source level and thereby reducing the human interaction and curbs pollution caused by improper segregation and management of wastes at source level[1].

NarendranSivakumaret. al [2016], introduced the concept of automation propose a spot segregation unit that effectively separates various categories of refuses generated by the municipalities. Since the generation of refuses cannot be curbed any

time soon, the only alternative is intelligent waste management practices. Waste management involves reduction, recycling, treatment and disposal of wastes Reduction in the quantity of the waste can be done by source reduction, concentration and segregation processes. Reuse refers to the case where certain wastes can be used again with very little reprocessing like discarded containers, plastic bottles. Recycling is different when compared to reusing in the sense that the wastes need to be thoroughly treated and reprocessed before they can be used again [2].

G. Pala Krishna Shyamet. al [2017], present a waste collection management solution based on providing intelligence to wastebins, using an IoT prototype with sensors. The data obtained through sensors is transmitted over the Internet to a server for storage and processing mechanisms [3].

Sam Raju et.al [2019], introduced to manage waste in big cities effectively without having to monitor the parts 24x7 manually. The Arduino Uno is a microcontroller board is dependent on the ATmega328, An infrared sensor is an electronic device that emits in order to sense some aspects of the surroundings. The emitter is simply an IR LED. A DC motor is any of a class of rotational electrical machines that changes over direct flow electrical energy into mechanical energy .This DC motor is used for segregating the wet and dry waste [4].

DhirajSunehra et.al [2021, a cost-effective Automated Waste Segregator system for the segregation of waste at the household level is implemented. The proposed segregator system segregates the waste into three types, viz., metallic, wet and dry, and in addition, separating dry waste further into paper and plastic. Around the world, some million tons of waste are generated each day. The major part of it is generated in metropolitan cities. Waste Segregator implemented here provides segregation of waste into wet, metal, plastic and paper at the entry level. This type of system can be fabricated in larger dimension for use in various places like educational institutions, offices, hotels, etc. The inlet section can be incorporated with a crusher mechanism to reduce the size of incoming waste. We can also make provision for on-spot decomposition of wet waste such as including a bio-gas plant[5].

III. METHODOLOGY

Systems engineering methodology is a structured approach to developing complex systems, such as waste segregation system, that emphasizes the development of a system that is optimized for the needs of the end-user. Here are the steps that could be involved in applying systems engineering methodology to the development of a waste segregation system:
1. Define the requirements: The first step is to define the requirements of the waste segregation system. This involves gathering information about the specific needs of the military, including the environments in which the model will be deployed and the tasks it will need to perform. The requirements should be specific, measurable, and achievable.
2. Design the system: Once the requirements have been defined, the next step is to design the system. This involves identifying the various subsystems that make up the model, including the mechanical, electrical, and software components. The design should be optimized to meet the requirements identified in step 1.

3. Develop and integrate the subsystems: The subsystems should be developed and integrated into the overall system. This involves designing the mechanical components, developing the software, and integrating the various subsystems into a cohesive system

4. Test and validate the system: Once the system has been developed, it should be tested and validated to ensure that it meets the requirements identified in step 1. This involves testing the model in a range of different environments and scenarios to ensure that it performs as expected.

5. Deploy and maintain the system: The final step is to deploy the model and maintain it over time. This involves ensuring that the model remains operational and meets the needs of the military, as well as updating the system as needed to incorporate new technologies and capabilities.

The Fig 3.1 shows the flow of the project process which helps to understand in an easy way.
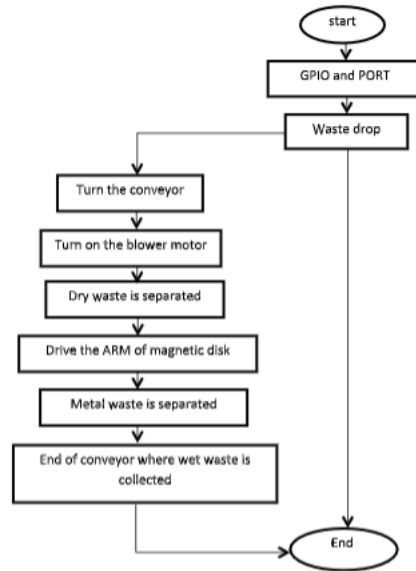
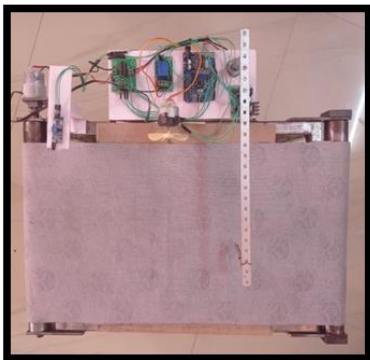Fig:-3.1 process flow of project

IV. EXPERIMENTAL RESULTS

Fig 4.1 Top View

Fig 4.2 Front View

Fig 4.3 Side View

Fig 4.4 Final result

Fig 4.1 shows the Top view whereIR Sensor, Conveyor belt and Arduino UNO are clearly seen. Fig 4.2 is the Front view of the project where blower machine is seen. Side view of the project is depicted Fig 4.3 in which Driver motor and metal lock sensor can be seen.

Final result of the project is depicted in Fig 4.4, when the waste materials like dry waste ,wet waste and metals like industrial waste are dumped in respective bins to collect each waste, IR sensordetects and starts the conveyor movement and turns ON the blower machine.When wastemoving on conveyor, towards the blower machine ,itseparates the dry waste from the wet waste. Metal lock is the magnet used to attract the metal waste, so the remaining is the only wet waste that gets collected in the respective bin which meant to collect wet waste.

V.CONCLUSION

In conclusion, implementing a waste segregation system project can bring numerous advantages, including improved waste management, increased recycling rates, reduced environmental impact, and enhanced sustainability. Waste segregation systems can beapplied in various settings, such as residential areas, commercial and industrial facilities,educational institutions, hospitality and tourism establishments, healthcare facilities,public spaces and events, construction and demolition sites, municipalities and local governments, industrial and manufacturing sectors, and specialized waste streams. By effectively segregating waste at the source and promoting responsible waste management practices, a waste segregation system project can contribute to a cleaner,healthier, and more sustainable environment for present and future generations.

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