

PLASTIC BOTTLE RECYCLER

MAKING PAVER BLOCKS USING PLASTIC BOTTLES

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Abstract : People in India throws away 2.5 million of plastic bottles per hour. The degradation rate of plastic is very slow process. Hence, we propose to reduce plastic waste. We propose to make a reverse vending machine for collection of plastic bottles. This is a multidisciplinary project and our system consist of standard recycle bin that is equipped with microcontroller and collection of sensors. Throughout the process, the sensors responsible to identifying user information, count the bottles and eventually convert the count to the corresponding points automatically. Once the process completed, the user can claim their points by using RFID point card. All the mentioned process will be controlled by a microcontroller. Then plastic bottles will be used for making paver blocks.

IndexTerms - Arduino, NFC, Plastic Waste, Reverse Vending Machine, Tachogenerator.

I. INTRODUCTION

Plastics have become a vital asset for humanity. Though extensive research and new technologies have led to invent of newer and safer plastics, but drawbacks and challenges of plastics have never been resolved and impact is on the rise. The proposed project serves the need for plastic waste management by building a machine which makes a paver block from waste plastic. The paver block paving is a commonly used decorative method of creating a pavement or hard standing.

II. LITERATURE SURVEY

The method proposed by Razali Tomari, Aeslina Abdul Kadir(2016) an automated recycle bin with a reward feature is proposed that derived from a reverse vending machine (RVM) concept. Basically, the system is implemented in a standard recycle bin provided by local municipal that equipped with microcontroller and collection of sensors. Throughout the process, the sensors responsible to identifying user information, weight the scale and eventually convert the weight to the corresponding points automatically. Once the process completed, the user can claim their points by using RFID point card[1].

B. Shanmugavalli K. Gowtham(2017) mainly studies to replace cement with plastic waste in paver block and to reduce the cost of paver block when compared to that of convention concrete paver blocks. The degradation rate of plastic waste is also a very slow process. Hence this study is helpful in reducing plastic waste in a useful way. In this study they have used plastic waste in different proportions with quarry dust, coarse aggregate and ceramic waste. The paver blocks were prepared and tested and the results were discussed[2].

Govind Pandey(2013) discusses prospects of plastic waste management schemes. It is concluded that the existing rate of environmental worsening is likely to continue unless long term remedial measures are adopted for plastic wastes management in the country[3].

C. Balaji(2018) prosed that Paver Blocks are the precast blocks that are used in the construction of various types of pavements. Cement, Coarse Aggregate and Fine Aggregate are majorly used in manufacturing of paver blocks. Due to the scarcity of raw materials cost of the raw materials also increasing rapidly. To overcome the issue they have incorporated an idea of partially replacing the coarse aggregate with plastic wastes. Plastic wastes are also increasing in the environment very rapidly and recycling of these plastic wastes are very tedious process so for effectively reusing it they have partially replacing the coarse aggregates with shredded plastic waste. Paver blocks are then casted and cured in the laboratory. Various strength parameters are tested and results have been arrived[4].

III. OBJECTIVE

The main objective of this paper is to reduce plastic waste. This can be done by recycling or reusing plastic waste. In this paper our idea is to reuse plastic. The paver block made of cement can be replaced with plastic paver blocks.

IV. PROCESS FLOW

The plastics waste will be collected and the appropriate reward of money (points) will be given to the depositor. The plastic bottle waste will be collected with the help of reverse vending machine. As the user throw the bottle, the user will be given a RFID card and the redeemable points will be stored in card. The waste plastic will be drawn in to Hooper of machine to shred for conversion of plastic into fine form. The muffle furnace heated this plastic in the liquid state by using the heating coil. The sand, coarse aggregate, cement and water are added increased the strength properties of paver block. This block after testing initially can be used to serve society by providing solid solution for plastic waste management. But in above steps Arduino will be used to detect some technical issues. Consider plastic waste got stuck in shredder so we will get an indication with the help of buzzer.

Recycling of plastic has advantage since it has a long service life and good binding property. Waste material like bottles which are shredded and melted may be used as ingredient for the manufacture of paver block. The melted plastic can be added with coarse aggregate replacing of by 20% the coarse aggregate, recycled aggregate, plastic aggregate, sand, cement and water may be mixed together in the mixing chamber of machine to get a uniform consistent mix of concrete. This can be reflected in the molds of paver block placed on vibratory box after curing the block may be tested for compressive strength.

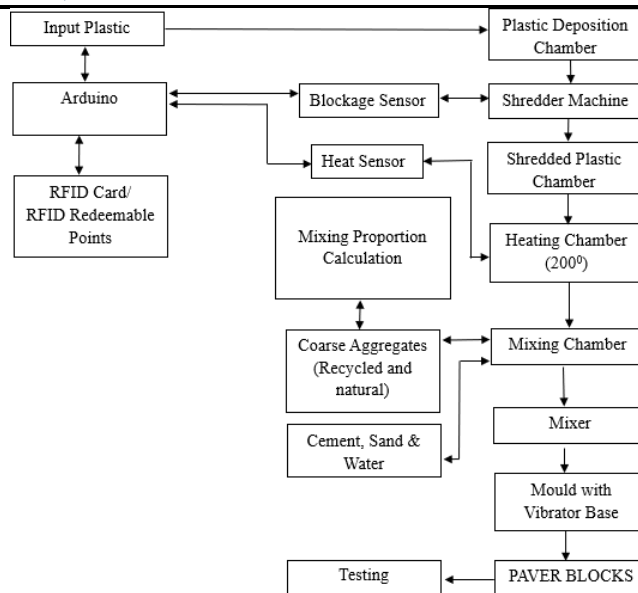


Fig 1: Flow Chart of Process

V.SYSTEM OVERVIEW

We are controlling the reverse vending machine using ATMEGA 328 microcontroller. Since NFC codes are easily available in Arduino library, we are using microcontroller ATMEGA328 instead of Arduino. To redeem the points based on bottles inserted we require read-writeable card as well as reader. Thus, we will be using NFC card and NFC reader. Operating voltage of NFC reader is 3.3V. Output of NFC will be displayed on LCD.

To insert the bottles there will be flap/door which will be controlled by motor. For these two transistors will be used, through relay mechanism. Relay mechanism will be helping in opening or closing of flap/door. Shredder will be used to shred the plastic bottles. Due to any reason if shredder stop working, tachogenerator will be used to detect cause. Similarly, to maintain the temperature in the heating chamber thermistor will be used. If tachogenerator or thermistor detects any problem in process then it will give an indication with the help of buzzer. Main power supply is of 230V, thus stepdown transformer will be used to reduce voltage.

Table1: Power Consumption by Different Components

Component	Operating Voltage
Buzzer	12V
LCD	5V
Microcontroller	5V
Motor	12V
NFC Reader	3.3V
Thermistor	5V

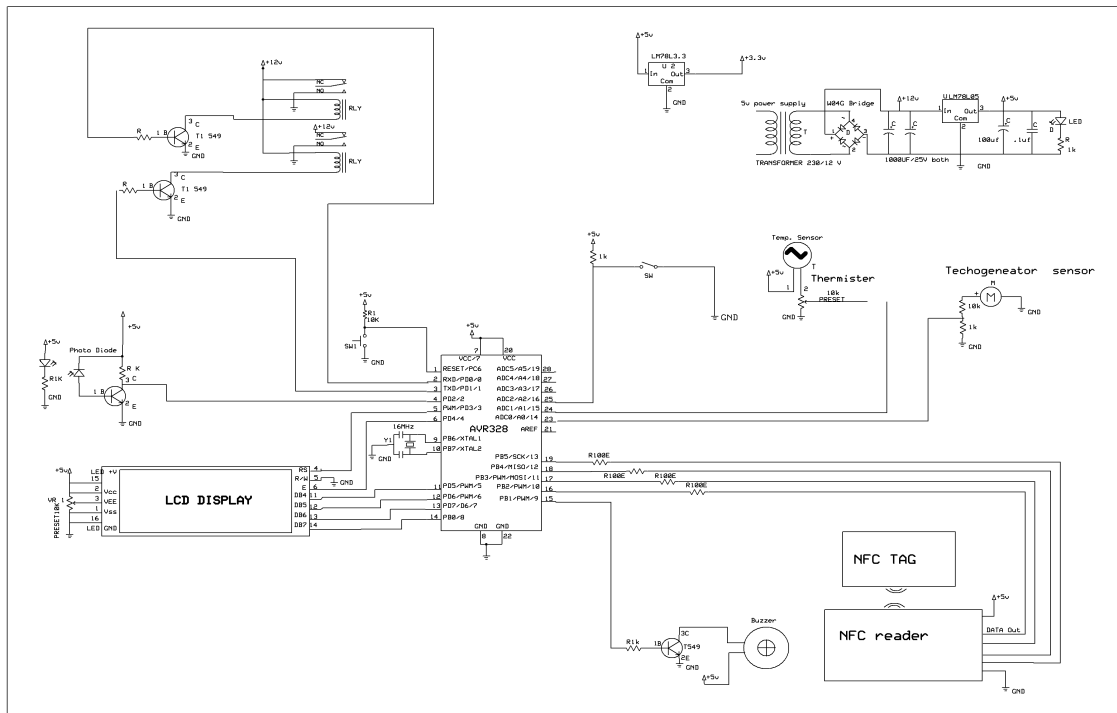


Fig2:Circuit Diagram of System for Reverse Vending Machine

VI. CONCLUSION

In this paper, a reverse vending machine which will be useful to reduce and recycle the plastic waste will be constructed. This reverse vending machine can be installed at public places such as shopping malls, airports, railway station, etc. For this project we have constructed the PCB. We are planning to finish this project soon

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