

Automatic Wastage Collection Using Robotic System

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Abstract— The world today faces major garbage crisis- the product of rapid economic growth, overcrowding, poor urban planning, corrosive corruption and political dysfunction. The present tried and tested methods of garbage collection have so far been proven ineffective. And the world today is looking at smarter ways of overcoming the garbage collection problem. This project of 'Automatic wastage collection using Robotic system'. The robot is built on a metallic base of size 50x40 cm which is powered by battery of 12V, 7.5Ah. The robot movement is controlled by programming the ARDUINO and MATLAB Image Processing System. The robot is designed to collect Garbage at foot path, public places (parks, schools and colleges), mostly cemented paths and beach. The robot is built in such a way that, when it is started it will move on the path defined in the program. When Camera encounters the obstacle, depending on the conditions applied in the program the Robot proceeds with further motion and then robot picks up the garbage.

Key words: Garbage, Image Processing, Microcontroller, Mobile Robot

I. INTRODUCTION

Authentication Garbage is the major problem not only in cities but also in rural areas of India. It is a major source of pollution. Indian cities alone generate more than 100 million tons of solid waste a year. In 2000, India's Supreme Court directed all Indian cities to implement a comprehensive waste-management program that would include household collection of segregated waste, recycling and composting. These directions have simply been ignored. No major city runs a comprehensive program of the kind envisioned by the Supreme Court. It is not wrong to say that India is on verge of garbage crisis even though 9000crore rupees are allotted for the Swachh Bharath Abhiyan started by the government of India in .There are already different type of garbage collection robots like Robo-Dumpster which mainly aims at collecting garbage from full cans and dispose it designated area and Dust cart which is designed to navigate through urban areas avoiding static and dynamic obstacle and waste door to door. These robots which are in use have various disadvantages like high implementation cost, not user friendly and aims at only collecting filled dustbins. Also, Municipal solid waste workers (MSWWs) or refuse collectors, universally expose too many work related health hazards and safety risks, notably allergic and other diseases of the respiratory system. Health impacts could also entail musculoskeletal, gastro, intestinal and infectious diseases as well as injuries caused by work- related accidents.

II. METHODOLOGY

The Automatic Wastage Collection Using Robotic System has wide scope in cleaning applications. The most popular application is colleges, bus stands, railway station, or temples where garbage is present. When garbage is seen in the camera

it will be detected by using Matlab software and send the signal to the robotic system. Then robotic system go towards the garbage and collect the garbage by using vacuum cleaner. It will reduce the human power or human efforts and help to keep the place clean. The proposed system of automatic wastage collection using robotic system as per proposed block diagram shown in figure 1.

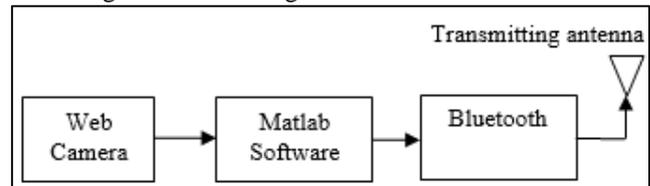


Fig. 1: General Block Diagram of Transmitter Section of Automatic Wastage Collection Using Robotic System

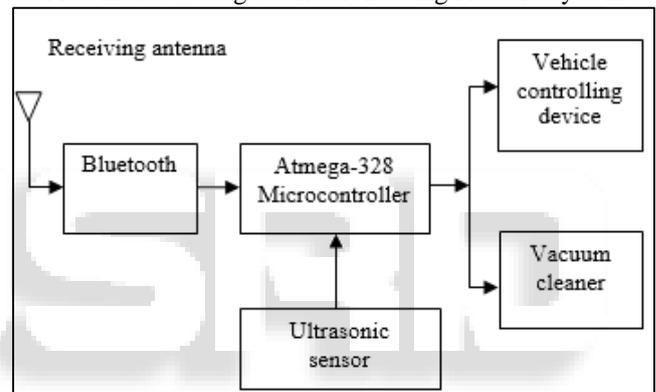


Fig. 2: General Block Diagram of Receiver Section of Automatic Wastage Collection Using Robotic System

This algorithm is very simple and composed of two stages. In that first stages consist of image processing & second stage is path tracking that is hardware part. These stages are discussed below briefly. At the all working stage of project it is necessary to know the hardware and software techniques.

A. Basic Image Processing

We perform background subtraction for the motion segmentation in static scene .This algorithm is useful to detect moving region by subtracting the current image pixel by pixel from a reference background image. Here we have considered first frame from an input video sequence as a reference frame & we have calculated the difference between each frame. The pixels where the difference is above threshold are classified as a foreground. Background subtraction is done in Hue Saturation Value color space model in order to avoid the effects of illumination changes & shadows. After detection of foreground pixel map some morphological post processing operations such as opening closing are performed in order to reduce the effect of noise and enhance the effects of noise & enhance the detected regions. For color quantization & image segmentation Mean Shift Algorithm is used because it provides better segmentation results than other approaches

such as less over segmentation and avoids effects of shadows & illumination changes. Figure shows the block diagram of our method.

B. Hardware based technique

1) Communication Technique:

The communication between robotic system and MATLAB software can be done by using Bluetooth,

2) Bluetooth:

Bluetooth is referred as short distance wireless technology. It is wireless technology based on IEEE802.5.1. It is used for exchanging the data over short distance from fixed and mobile devices and also used for building the personal area network i.e. PANs. Jaap Haarsten who is a Dutch electrical engineer invented Bluetooth technology, when he was working for 'Ericsson' in 1994. It was used another option for RS232 cables. Bluetooth operated at frequency between 2402 MHz and 2480 MHz by including the guard band of 3Mhz wide at bottom end and 3.5Mhz wide at top. It is also known as packet based protocol along with master slave architecture. The master communicates with the slave in piconet i.e. an Ad hoc network used in the Bluetooth technology. The master Bluetooth device can communicate with maximum seven slave devices.

3) Controlling Action:

The controlling action for robot is done by the devices which are mostly used:

a) By using Microcontroller:

Microcontroller is heart of system and use to coordinate entire operation of system. It is single chip which contains the CPU (which is also called as processor). ROM and flash memory i.e. non volatile memory used for program, RAM i.e. volatile memory used for input output, a clock signal, timer and input output control unit. Microcontroller is used to control the system with the help of set of specific functions. By using the signals from the Matlab the direction of the robot is controlled. And microcontroller also controls the turn on and turns off the vacuum cleaner.

4) Collecting System:

For collecting the garbage we have placed the small vacuum cleaner on the robot, Which is controlled by using the microcontroller. When robot reach near the garbage then microcontroller turn on the vacuum cleaner and after collecting the garbage microcontroller turn off the vacuum cleaner.

includes IC ATmega16 with 5 Volt voltage and 1,1 m Ampere current, IC Driver with 12 Volt voltage and 1,2 Ampere current, and Limit switch as the controller. Support devices of the robot are mechanical robot, control system, sensor system, and actuator robot. The maximum load drives the garbage receptacle until 5 kg. The average speed of robot when take out the garbage is 0,26 m/s.

Apurva s.* Apoorva S.*, Chaithanya, Rukuma S. Prabhu, Saiswaroop B. Shetty, Denita D'Souza "Autonomous Garbage Collector Robot", India International Journal of Internet of Things 2015, 40-42 DOI: 10.5923/j.ijit.2017.V0602.06

Garbage Collector robot for foot path using ARDUINO microcontroller. The robot is built on a metallic base of size 50x40 cm which is powered by battery of 12V, 7.5Ah. The robot movement is controlled by programming the ARDUINO. The robot is designed to collect Garbage at foot path, public places (parks, schools and colleges), mostly cemented paths and beach. The robot cannot be used on muddy surfaces. The robot is built in such a way that, when it is started it will move on the path defined in the program. When it encounters the obstacle, depending on the conditions applied in the program the bot proceeds with further motion and then robot picks up the garbage.

Nithya.L1, Mahesh.M2 "A Smart Waste Management and Monitoring System using Automatic Unloading Robot", International Journal of Innovative Research in Computer and Communication Engineering Vol. 4, Issue 12, December 2016 A Smart Waste Management and Monitoring System with automatic Unloading Robot To give a brief description, at the public places, the sensors are placed in the common garbage bins. When the garbage reaches the level of the sensor, then that indication will be given to PIC microcontroller. Robot used to collect the wastes after reaching high wastage level. To move the robot from garbage area and unload the wastage by Using DC Motor. The waste filling level and air pollution level is sent as message through GSM modem interface to the microcontroller. The outcome of this method is efficient and intelligent and can be used to automate any solid waste bin management process.

Sirichai Watanasophon and Sarinee "Garbage Collection Robot on the Beach using Wireless Communications". IPCBEE vol.66 (2014) IACSIT Press, Singapore DOI: 10.7763/PCBEE. 2014. V66. 19. This project developed the robot for collecting the garbage at the beach. Wireless communication (Bluetooth and Ad-hoc) was applied to the robot for remote controlling. The developed robot can move at 0.5 m/s on the sand. PIC18F4550 was used as the brain for processing all commands. The robot can move with an average speed of 0.5 m/s on the sand via wireless communication and collect the large garbage with side 12.5 x 49 cm.

III. LITERATURE REVIEW

A. AGATOR (Automatic Garbage Collector)

Garbage Collector Robot Model Osiany Nurlansa, Dewi Anisa Istiqomah, and Mahendra Astu Sanggha Pawitra, Member, IACSIT International Journal of Future Computer and Communication, Vol. 3, No. , October 2014 AGATOR (Automatic Garbage Collector), a rotor robot model as automatic garbage collector to counter accumulation of garbage in the river which has no flow effectively and efficiently. The method of implementation is design and construction. This method includes the identification of needs, analysis of the components required specifically, hardware and software engineering, developing, and testing. The test results obtain data by specification of AGATOR

IV. FINAL RESULT

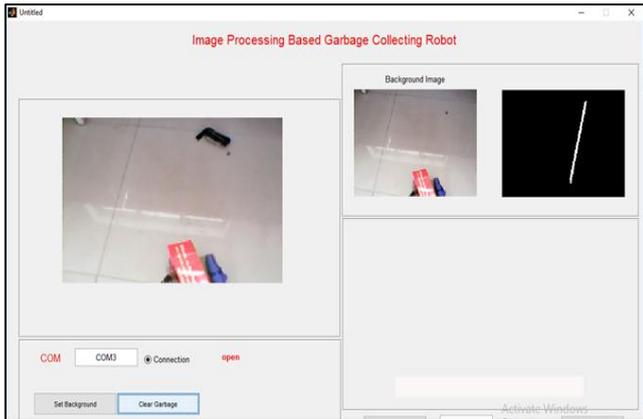


Fig. 3: When Robot is at initial Position

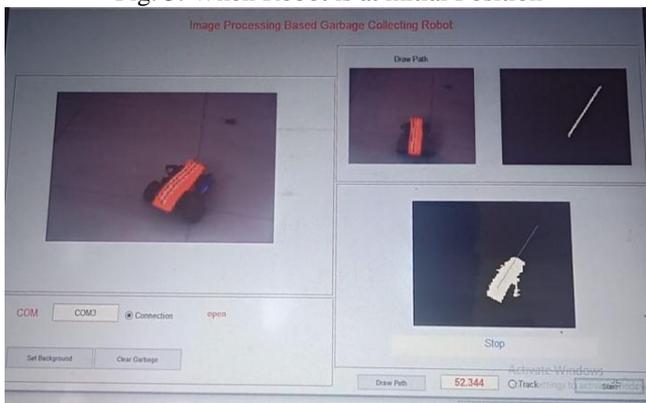


Fig. 4: After detecting path

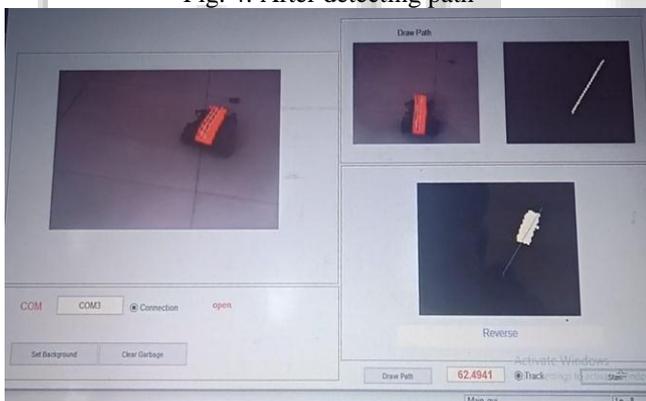


Fig. 5: When Robot reaches to its target-

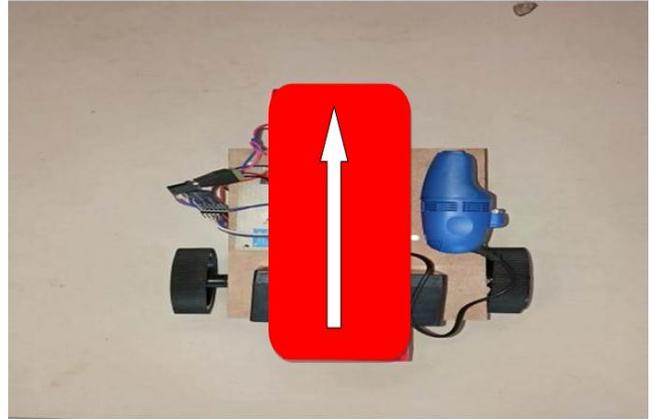
A complete GUI window for collection of waste material using Matlab. It calculates the X, Y coordinates for robot, while tracking the path.



Robot is being ready to detect any garbage in front of webcam.

The track is followed by the robot by using MATLAB commands

The robot is now follows the path to detect the garbage and clean it through vacuum cleaner



V. CONCLUSION

In this project the proposed robot will make the life of human a lot simpler. To automate the process cleaning the garbage we suggest a robot with a vacuum cleaner with some degree of freedom which is able to clean the garbage. As we know that automation is increased day by day. Hence we use this system to avoid human errors, to save time.

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