



ELECTRICITY CUM FUEL GENERATION FROM GARBAGES USING ELECTRO-MECHANICAL TRASH CAN

Swathi.R¹, Navsath begum.T², Preethika.V³, Manjulavani.H⁴
^{1,2,3,4} Department Of Electronics and Communication Engineering
Kings College of Engineering, Punalkulam, Tamil Nadu

Abstract –This paper was proposed to design an electronic system, in order to provide a solution to irregular waste disposal system. The designed system makes use of IR sensor to avoid overflow of the waste in the dust bin. The technology which are suggested in this paper, achieved effective waste management system where sensors unit are used for sensing, microcontroller for controlling and converting the plastics into power. For operating this entire system we used solar energy system.

Keyword: Electro-mechanical trash can, Vibration motor, Gear motor, Thermoelectric plate, PIC 16F877A.

I. INTRODUCTION

Nowadays, the disposal of plastic waste is the major problem in our country. In this paper, we proposed a system which will separate plastics from other wastes and convert the plastic waste into power. According to a recent survey close to 90 per cent felt that improper waste management imposed 'severe' (67 per cent) to 'moderate' (23 per cent) health hazards. Poor waste handling and disposal can lead to environmental pollution, encourage the breeding of disease-vector insects, animal scavengers and rodents, and result in a range of diseases. The environmental degradation as well as health impact of people caused by inadequate disposal of waste can be expressed by the contamination of surface and ground water through direct waste contacts, air pollution by burning of wastes, spreading of diseases by different vectors like birds, insects and rodents, or uncontrolled release of methane by anaerobic decomposition of waste. Diseases, such as Dengue fever, prevalent in developing nations, are believed to be perpetuated by unsanitary waste disposal methods.

The existing plants where the plastics are recycled emits the content like sulphur and other harmful gases like CO₂ etc. The waste handling system is also manual. These are all causes various health hazards to the environment as well as to the workers who works in that plant.



II. EXISTING SYSTEM

In existing system the plastic waste is thrown along with the other garbage and dumped in to a common place where all the municipal waste is dumped. The plastics are recycled but the quality of the recycled plastic is not as good the quality of its original form.

III. PROPOSED SYSTEM

In our proposed system the garbage's will automatically disposed and the plastic wastes are converted into electricity cum fuel. We can minimize



the emission of harmful gases by using air filter. Monitoring and controlling the process from remote place is also possible. In the proposed system there are two sections one is automated and the other one is manual. The process of transferring the waste from the bin to the conveyor and then separating the waste into plastic and paper are automated. Another one is the process of conversion of plastic waste into electricity which are manually operated.

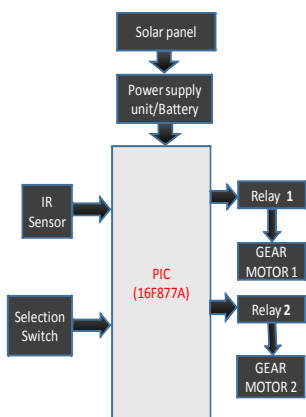


Fig.2 Block diagram of trash can

Fig.2: The inner structure of the trashcan contains IR SENSOR. The scraps are collected in the trashcan when it reached certain level the sensor will sense, the information is Passed to the microcontroller which it will turn on the gear motor which will pull down the piston to remove the waste from the trashcan. After some time the piston will come to its original position and the bottom of the bin will get opened.

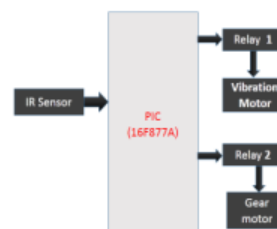


Fig.3 Block diagram of conveyor

Fig.3: After unloading process, the scraps will fall on the conveyor belt there will be another IR SENSOR to sense the scraps after sensing it vibration motor will turn on which will separate the light weight particles like papers from the plastics. It will be collected by the one bunker. After certain time the vibration motor will turn off, the gear motor gets activated to rotate the conveyor belt, the plastic will drop into another bunker.

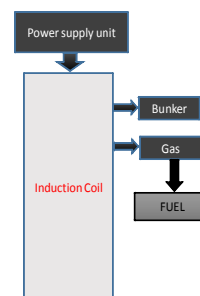


Fig.4 Block diagram of bunker

Fig.4: Then the plastics will be ignited by induction coil. In which the plastics are melted to produce gas. During melting smoke will be emitted which is flammable gas and after further process fuel will be generated.



IV. HARDWARE DESCRIPTION

A. PIC16F877A MICROCONTROLLER

The microcontroller that has been used for this project is PIC16F877A. This controller is widely used for experimental and modern applications because of its low price, wide range of applications, high quality, and ease of availability. It is ideal for applications such as machine control applications, measurement devices, study purpose, and so on. It is used as the brain of this project. The function of this section is to collect the information from the IR sensor and it will turn on the vibration motor and Gear motor. PIC16F877A is high performance RISC (Reduced Instruction Set Computing). Watch dog timer is present inside this IC. Watch dog timer will automatically reset the PIC IC from infinite loop condition. 5 ports are present in PIC. They are, Port A, Port B, Port C, Port D, Port E. Here port A have 6 pins. Port B, Port C and Port D have 8 pins each. Port E have 3 pins. Port A and port E having analogue capability. It consists of three timers. Timer 0, Timer 1, Timer 2. Timer 0 is 8 bit timer/counter. It is both readable and writable. Timer 1 is 16 bit timer/counter. It consists of two 8 bit registers. Timer 2 is an 8 bit timer. Another feature of PIC16F877A is ADC and USART. ADC is an analog to digital convertor module. USART is Universal Synchronous Asynchronous Receiver and Transmitter. Here USART is used for transmit and receive the data to and from the serial port. Port C6 and Port C7 are used as a transmitter and receiver port. USART consists of two registers. They are TXSTA (Transmit status and control register) and RCSTA (Receive status and control register). We enable the TXEN (Transmit enable bit) and BRGH (baud rate high bit) in the TXSTA register. We enable SPEN (serial port enable bit) and CREN (continuous receive enable bit) in the RCSTA register. [5] presented a short overview on widely used microwave and RF applications and the denomination of frequency bands. The chapter starts with an illustrative case on wave propagation which will introduce fundamental aspects of high frequency technology.

B. VIBRATION MOTOR

A vibrating motor is essentially a motor that is improperly balanced. In other words, there is an off-centered weight attached to the motor's rotational shaft that causes the motor to wobble. The amount of wobble can be changed by the amount of weight that you attach, the weight's distance from the shaft, and the speed at which the motor spins.

Vibrating motors can be found inside cell phones, pagers, gaming controllers, and personal massagers. In our project we use this motor to separate the plastics from other scraps by wobbling (vibrating).

C. GEAR MOTOR

Gear motor is an electrical motor that is designed to produce high torque while maintaining a low horse power or low speed motor output. Gear motors are commonly used in devices such as can openers, garage door openers, washing machine time control knobs and even electric alarm clocks. In our concept we are using gear motor to turn on the piston and unloader and to rotate the conveyor belt.

- 500RPM 12V DC
- Shaft diameter: 6mm
- No-load current = 60 mA(Max)
- Load current = 300 mA(Max)

D. IR PROXIMITY SENSOR

An IR proximity sensor works by applying a voltage to a pair of IR light emitting diodes (LED's) which in turn, emit infrared light. This light propagates through the air and once it hits an object it is reflected back towards the sensor. If the object is close, the reflected light will be stronger than if the object is further away. The sensing unit (for this experiment a Sharp IS471FE will be used), in the form of an integrated circuit (IC), detects the reflected infrared light, and if its intensity is strong enough, the circuit becomes active. When the sensing unit becomes active, it sends a corresponding signal to the output terminal.



which can then be used to activate the devices (Gear motor and Vibration motor).

E. THERMOELECTRIC PLATE

Thermoelectric coolers operate according to the Peltier effect. The effect creates a temperature difference by transferring heat between two electrical junctions. A voltage is applied across joined conductors to create an electric current. When the current flows through the junctions of the two conductors, heat is removed at one junction and cooling occurs. Heat is deposited at the other junction. Here it is used to generate voltage by giving heat energy which is generated from the plastics at one side and cold at another side from the environment.

- Type: TEC1-12706
- Operational Voltage : 12 VDC
- Current Max : 6 Amp
- Voltage Max : 15.4 VDC
- Power Max : 92.4 Watts
- Q_{cmax} - 62.2W
- T_{max} - 69°C
- Max Operating Temp: 180°C
- Min Operating Temp: -50°C

V. SOFTWARE DESCRIPTION

In this project, we are using MPLAB IDE.

A. MPLAB IDE

MPLAB is a proprietary freeware integrated development environment for the development of embedded applications on PIC microcontrollers, and is developed by Microchip Technology. MPLAB and MPLAB X support project management, code editing, debugging and programming of Microchip 8-bit, 16-bit and 32-bit PIC microcontrollers. MPLAB is designed to work with MPLAB-certified devices such as the MPLAB IC 3 and MPLAB REAL ICE, for programming and debugging PIC microcontrollers using a personal computer.

VI. CONCLUSION

This project makes our environment eco-friendly. The threats caused by plastics can be reduced and it is used in an effective manner to produce electricity. This will make our environment pollution free. In future we can also construct a system which can use the other wastes like (rotten vegetable & fruits, dry plants etc...) to generate power.

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