ENTREPRENEURSHIP DEVELOPMENT INSTITUTE OF INDIA
Near Village Bhat, Via Ahmedabad Airport & Indira Bridge, P.O. Bhat - 382 428, Dist. : Gandhinagar, Gujarat, India.
Tel. : +91-79-23969153, 23969158, 23969159, 23969161 Telefax : +91-79-23969164
E-mail : info@ediindia.org Website : www.ediindia.org

Prakash Solanki
Faculty & National Project Coordinator

EDII/DST-NIMAT/19-20/RLS-I/511
Date: 04/11/2019

SPEED POST

Dr. M. Subaschandrabose
Principal
Ganesh College of Engineering
Attur Main Road, Mettupatti
Salem - 636 111
Tamil Nadu

Kind Attention: Prof. G. Vishalakshi, Associate Professor Cum EDC Coordinator

Dear Sir,

Sub: 1st Installment of Programme/s Sanctioned under DST–NIMAT Project 2019-20

This is with reference to the Agreement signed between EDII and your organization for conducting programme(s) under DST-NIMAT Project 2019-20 to create techno-entrepreneurs and resource persons through Entrepreneurship Development Programme Agency.

As per the Agreement, 80% of the sanctioned amount per programme is to be released before commencement of the programme(s). Accordingly, **Rs. 16000/-** has been credited in your bank account on **23/10/2019.** The detailed brake-up of the total amount is as following:

Sr. No.	Programme / Activity	No. of Programme Sanctioned	1st Installment per Programme (Rs.)	Total Amount of the Programme (Rs.)
1	EAC	1	16000/-	16000/-
			Total	16000/-

You are requested to please send us the receipt for the same.

Thanking you, with regards

Yours sincerely,

Prakash Solanki
Encl.: 1) Copy of Agreement, 2) Copy of T & C

PRINCIPAL
Ganesh College of Engineering,
Attur Main Road, Mettupatti,
SALEM-636 111.

Ganesh College of Engineering SALEM 636 111

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Ganesh College of Engineering SALEM 636 111

S. B. Sareen
Sr. Faculty & Project Director DST-NIMAT

[illegible]/NIMAT/19-20/295
Date: 12/08/2019

SPEED POST

Dr. M. Subaschandrabose
Principal
Ganesh College of Engineering
Attur Main Road, Mettupatti
Salem - 636 111
Tamil Nadu

Kind Attention: Prof. G. Vishalakshi, Associate Professor Cum EDC Coordinator

Dear Sir,

Sub: DST-NIMAT Project 2019-20: Sanction Order

Greetings from Entrepreneurship Development Institute of India, Ahmedabad!

This is with reference to your proposal submitted for conducting activities / programme(s) under the aegis of National Science & Technology Entrepreneurship Development Board (NSTEDB), Department of Science and Technology, Government of India, New Delhi.

We are happy to inform you that the following activities / programmes have been sanctioned:

Sr. No.	Activity / Programme	No.	Amount in Rs.	Locations
1	Entrepreneurship Awareness Camp (EAC)	1	20000	As mentioned in proposal
	Total	1	20000	

You are requested to please go through the enclosed **Guidelines / Terms & Conditions as it is mandatory to follow the same.**

Please note that the **first installment is to be released on receipt of the following documents:**

1. **Duly Signed Agreement**
2. **Duly Signed "Terms & Conditions"**
3. **Action Plan [Annexure-I]**
4. **Bank Details [Annexure-IA]**

The funds will be transferred through RTGS/NEFT. Please make sure that the above said **documents must reach us as early as possible, but not later than ONE MONTH** of receiving this sanction letter. **Non receipt of the same may be considered as your unwillingness to take up the programme(s).**

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For any additional information, please contact either me (Email ID: sareen@ediindia.org, Mobile: **09925110040**) or my colleague **Mr. Prakash Solanki** (Email ID: psolanki@ediindia.org, Mobile: **09723816384**).

We look forward to have a long term professional relationship.

Thanking you, with regards,

(S. B. Sareen)
Encl.: a. a

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Attur Main Road, Mettupatti,
SALEM-636 111.

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≡ M Gmail

Project ID - EEE-052- Development Of A Robotic Airboat For Online Water Quality Monitoring In

Vinod B

Dear sir/Madam,

Ref.: 1 Council approval dt.18.03.2020
2. Announcement in council's website dt.12.09.2020 & e mail dt. 14 .09.2020

With cited to the above Reference email, herewith attaching the seminar paper of my selected project work to your kind knowledge. Also for your kind notice the Utilization certificate (2 copies) on 28.09.2020 to the address TNSCST, Dote Campus, Chennai Through Courier Service

Note: Project code: EEE-052
Project Title: **Development Of A Robotic Airboat For Online Water Quality Monitoring In Lakes**

Thanking you

B. VINOD, B.E., M.E.,
Assistant Professor/ECE
Ganesh college of Engineering
Mettupatti, Salem 636111

PRINCIPAL
Ganesh College of Engineering
Attur Main Road, Mettupatti,
SALEM-636 111

SALEM 636 111

தமிழ்நாடு அறிவியல் தொழில்நுட்ப மாநில மன்றம்
TAMIL NADU STATE COUNCIL FOR SCIENCE AND TECHNOLOGY
(Established by Government of Tamilnadu)
Directorate of Technical Education Campus, Chennai - 600 025
Phone : 044 - 2230 1428
Telefax : 044 - 2230 1552
Web : www.tanscst.nic.in
E-mail : ms.tanscst@nic.in/enquiry.tanscst@nic.in

DR. R. SRINIVASAN, M.Sc., Ph.D., F.I.C.S., M.A.C.S. (USA)
Member Secretary

Lr no TNSCST/SPS/2019-20/6/ 07 07 2021

To

Registrar/Director/Dean/Principal

Sir

Sub TNSCST-Student Projects Scheme (2019-20)-Project Completion certificate Proceedings-sent-regarding

Kindly find enclosed herewith the project completion certificate of your students under Student Project Scheme (2019-20) of the state council and a CD containing findings of the projects as proceedings. I request you to distribute the certificates to the students concerned

Thanking you

Member Secretary

Encl as above

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DEVELOPMENT OF A ROBOTIC AIRBOAT FOR ONLINE WATER QUALITY MONITORING IN LAKES

ABSTRACT

Maintenance of water resources through collection of water followed by laboratory analysis, is a key factor in the measurement of water quality. In this paper, the development, construction, and implementation of a robotic airboat to measure water quality in lakes has been described. The airboat was developed in the form of a mini-boat, in a fiberglass structure, whose interior housed a battery, a Raspberry Pi mini-computer, a Wi-Fi router for connection to a notebook, tablet or cell phone, and sensors connected to the Arduino platform. The main contribution of this work was the development of an autonomous system of acquiring water parameters from several points of the lagoon.

INTRODUCTION

The traditional process of monitoring water quality is basically composed of two steps—a manual collection of water samples at each time interval and laboratory analysis. The National Water Agency of Brazil (NWA) operates a basic water quality network with 1340 points, nationwide, analyzing basic parameters such as pH, dissolved oxygen, and temperature. These parameters are obtained automatically by means of multiparametric probes, which are put in contact with water, avoiding collection, transport, and analysis of samples in laboratories. Additionally, according to the National Water Quality Assessment Program (NWQP), however, there are no standardized procedures for collection, the frequency of collection, and analysis of information, which impairs the comparison of results and the sharing of experiences.

Due to this lack of standardization regarding the number of collection points, this methodology can cause a significant variability, depending on the number of collection points, between the calculated and the actual results. In order to overcome this problem, it is important to carry out the planning of the collection points that can effectively represent the lagoon, as well as implement its correct execution.

OBJECTIVE OF THE STUDY

Considered pH, temperature, dissolved oxygen, and water transparency to assess and monitor water quality. The amount of oxygen dissolved, as well as pH and temperature, must be monitored in real time so that, in case of abnormal concentrations of these parameters, corrective actions can be taken, since these parameters influence growth, reproduction, and feed efficiency. The maintenance of water resources through water collection and laboratory analysis, is a key factor in the measurement of water quality. The main obstacles to the aforementioned actions are related to logistics, as it is a manual process, and the transport and storage of the samples requires strict procedures of hygiene and minimal human intervention.

WORKING

First, the software embedded in the boat was loaded into some computerized device, equipped with a Wi-Fi connection, then the mission was named and the waypoints were determined by the operator. Once these configurations were made, the boat was put into the water and remotely activated to start the mission, autonomously, doing the physical-chemical analysis of water and storing it in the database associated with its Latitude and Longitude coordinates. At the end of

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the mission, the boat returned, automatically turned-off the aerodrive, and the operator could generate reports with the data collected. For initial tests, the system was operated remotely and manually, where the route was random and determined during the mission. During the route, the boat carried out the analyses and stored them in a database. The reports were then validated, in order to generate graphs of the collected points. After the initial tests, the GPS navigation algorithm was developed, so the boat started to navigate, autonomously, collecting data, storing them in the database, and associating each waypoint with the GPS coordinates, thus, generating more complete reports, including the programmed trajectory versus the trajectory carried out.

MATERIALS AND METHODS

The system used commonly purchased components, such as cardboard and fiberglass, as well as Arduino open source hardware and software, and a Raspberry Pi minicomputer, which provided easy integration and modification of the software and firmware, during the verification and validation tests. In the first step, the hull of the boat was built and checked for buoyancy. In the second step, all the hardware material necessary for the electronic and mechanical control of the boat was listed. The acquired measurement sensors of the water parameters, carried out the calibration of the Atlas sensors, using the Arduino platform, which occurred satisfactorily, based on the values of its calibration solutions with small variations of two points. Then it conducted tests with the IMU, the GPS, the servo of the rudder, the aerodrive, and the temperature sensor in the plate Raspberry Pi. In this phase, the protocol for communication with the sensors was developed. In the third step, the control software with access to the database was developed, which provided a greater control and monitoring of the boat's functionality, from the configuration of the mission to the generation of reports.

RESULTS

This prototype gives good results for an automatic field analysis, to provide relevant data on lagoon conditions. Along with the explicit benefits of data collection and analyses. It also helps to understand the biome and the behavior of aquatic animals in relation to water pollution, in a precise way; Providing a better evaluation of the lagoon.

CONCLUSION

This work described the development, construction, and implementation of a robotic airboat to measure water quality in lakes. This prototype gives good results for an automatic field analysis, to provide relevant data on lagoon conditions. Along with the explicit benefits of data collection and analyses, other important contributions of this work are—this system helps to understand the biome and the behavior of aquatic animals in relation to water pollution, in a precise way; Providing a better evaluation of the lagoon. In addition, the use of Wi-Fi, even with a limited range, did not cause a loss of performance to the vehicle. The boat operated entirely autonomously, through its embedded system, fulfilling the mission designed for it. The data collected was stored on board and transmitted to the station, when it was within the limit of the Wi-Fi transmission.

Guide: Mr. B. VINOD, M.E; Assistant Professor, Department of ECE, Ganesh College of Engineering, Salem.

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TAMILNADU STATE COUNCIL FOR SCIENCE AND TECHNOLOGY

GOVERNMENT OF TAMILNADU

CERTIFICATE

This is to certify that Mr. A. Jeeva, Ganesh College of Engineering, Salem - 636 111 has successfully completed the project titled "***Development of a Robotic Airboat for Online Water Quality Monitoring in Lakes***" in the Sector ELECTRICAL, ELECTRONICS AND COMMUNICATION ENGINEERING under **STUDENT PROJECT SCHEME** sponsored by the Council during the academic year 2019-2020.

Chennai-600025
18.12.2020

DR.R.SRINIVASAN
Member Secretary

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TAMILNADU STATE COUNCIL FOR SCIENCE AND TECHNOLOGY

GOVERNMENT OF TAMILNADU

CERTIFICATE

This is to certify that Mr. S. Gurubharan, Ganesh College of Engineering, Salem - 636 111 has successfully completed the project titled "***Development of a Robotic Airboat for Online Water Quality Monitoring in Lakes***" in the Sector ELECTRICAL, ELECTRONICS AND COMMUNICATION ENGINEERING under **STUDENT PROJECT SCHEME** sponsored by the Council during the academic year 2019-2020.

Chennai-600025
18.12.2020

PRINCIPAL
Ganesh College of Engineering
Attur Main Road
SALEM-636 111

DR.R.SRINIVASAN
Member Secretary

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TAMILNADU STATE COUNCIL FOR SCIENCE AND TECHNOLOGY
(Govt. of Tamilnadu)
DOTE Campus, Chennai - 600 025
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www.tanscst.nic.in E-mail:enquiry.tanscst@nic.in ms.tanscst@nic.in

Dr.R.SRINIVASAN, M.Sc., Ph.D.,F.I.C.S., M.A.C.S.(USA),
Member Secretary

Ref: TNSCST/SPS/AR/2018-2019/ 24.06.2019

To
Mr.S.Manivannan
Assistant Professor
Dept. of ECE
Ganesh College of Engineering
Mettupatti
Salem-636111

Sir/Madam,

Sub: TNSCST Programme 'Student Project Scheme' – Conduct of Seminar–Cum-Exhibition – Invitation extended – reg.

With reference to the above, the Seminar-cum-Exhibition has been arranged on **19th** and **20th JULY 2019** at **Kalasalingam Academy of Education and Research (Kalasalingam University), Krishnankoil, Srivilliputhur-626126**. I request you to kindly ensure that one of the student who did the project must come to Krishnankoil and present the findings of the project in the seminar. Models pertaining to the project can be exhibited and share your innovative ideas with others.

The following points may please be noted:

- The student must report to coordinator Dr.R.Ramalakshmi (9486486642 & rama@klu.ac.in) & Dr. N Nallamuthu (8220471458 & nnallamuthu@gmail.com) Kalasalingam Academy of Education and Research, Krishnankoil, Srivilliputhur-626126.
- Accommodation and food will be provided from the evening of 18th July 2019 till the evening 20th July 2019 in the college hostel.
- Only one student will be provided boarding and lodging in the College hostel. No charges need to be paid. **Second sleeper class train fare / Actual Bus (Govt. bus) fare** (Up & Down) from the Place of study to Kalasalingam Academy of Education and Research, Srivilliputhur will be provided for one student of each project.
- The student must be present on both the days (i.e) **19th and 20Th JULY 2019**.
- The student should make the oral presentation within the allotted time of 10 minutes and LCD Projectors will be provided.
- Request for specific requirement for display of project must be made in advance to the Co-ordinator.
- Certificate will be given to those who have done the project.
- Prizes will be given to the best presentation and best exhibit in each discipline.

Those who have not submitted the Utilization Certificate so far, kindly arrange to send the same immediately without any further delay.

I request you to co-operate in making this seminar-cum-exhibition a successful academic event.

Thanking you,

PRINCIPAL
Ganesh College of Engineering
Attur Main Road, Mettupatti
SALEM-636 111

Yours faithfully,

Member Secretary

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	Mr S Manivannan Assistant Professor Dept of ECE Ganesh College of Engineering Mettupatti Salem-636111	Automatic waste segregator and monitoring system	Nathiya K Shalini E	EEE-139	The Principal Ganesh College of Engineering Mettupatti Salem-636111	7500/-

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Attur Main Road, Mettupatti
SALEM-636 111

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TAMILNADU STATE COUNCIL FOR SCIENCE AND TECHNOLOGY
(Established by Government of Tamilnadu)
Directorate of Technical Education Campus, Chennai – 600 025.
Ph : 044-22301428, Telefax : 044-22301552 www.tanscst.nic.in

Dr.R.SRINIVASAN, M.Sc., Ph.D.,F.I.C.S., M.A.C.S (USA).,
Member Secretary

Lr.No.TNSCST/SPS/AR/2018-2019 18.02.2019

To
The Principal
Ganesh College of Engineering
Mettupatti
Salem-636111

Sir/Madam,

Sub: TNSCST – Student Project Scheme – 2018-2019 – approval intimation–grant release- reg.

With respect to the above scheme, the list of projects approved by the State Council is enclosed along with terms and conditions. Kindly read and ensure adherence to the terms and conditions such as submission of UC and seminar paper in time.

Kindly find enclosed here with the cheque for the approved grant and disburse the grant to the concerned students through the guides at the earliest.

Kindly send the utilisation certificate (format enclosed) and seminar paper (ref.T&C-no 5&6) on completion of the project.

Thanking you,

Yours faithfully,

18/2/19
Member Secretary.

Encl: a) Terms & Conditions (T&C)
b) Format of Utilisation Certificate (UC)
c) Cheque for Rs 7500/- No: 794985 dt:18.02.2019.

Copy to: Individual Guides

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Attur Main Road, Mettupatti,
SALEM-636 111.

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TAMILNADU STATE COUNCIL FOR SCIENCE AND TECHNOLOGY

GOVERNMENT OF TAMILNADU

TNSCST

CERTIFICATE

This is to certify that Ms.Nathiya.K, Ganesh College of Engineering, Salem-636111 has successfully completed the project titled "Automatic waste segregator and monitoring system." in the Sector ELECTRICAL, ELECTRONICS AND ENGINEERING under STUDENT PROJECT SCHEME sponsored by the Council during the academic year 2018-2019.

Chennai-600025
20.07.2019

DR.R.SRINIVASAN
Member Secretary

PRINCIPAL
Ganesh College of Engineering
Attur Main Road, Mamangam
SALEM-636 111

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TAMILNADU STATE COUNCIL FOR SCIENCE AND TECHNOLOGY

GOVERNMENT OF TAMILNADU

Nscst

CERTIFICATE

This is to certify that Mr.Bharath.R, Ganesh College of Engineering, Salem-636111 has successfully completed the project titled "Automatic waste segregator and monitoring system." in the Sector ELECTRICAL, ELECTRONICS AND ENGINEERING under STUDENT PROJECT SCHEME sponsored by the Council during the academic year 2018-2019.

Chennai-600025
20.07.2019

DR.R.SRINIVASAN
Member Secretary

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Ganesh College of Engineering
Attur Main Road, Melagalur
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AUTOMATIC WASTE SEGREGATOR AND MONITORING SYSTEM

Nathiya K, Shalini E

UG Students, Department of ECE,

Ganesh College of Engineering, Salem – 636111.

ABSTRACT

Rapid increase in population has led to improper waste management in metro cities and urban areas which has resulted in spreading of diseases. It is estimated that 2.02 thousand tones of municipal solid waste was generated in India particularly in Tamilnadu on 2017. The segregation, transport, handling and disposal of waste must be managed properly to minimize the risks to the public, and the environment. An efficient method to dispose the waste has been designed in our project, "automatic waste segregator and monitoring system". This paper proposes an automatic waste segregator (AWS) which is a cheap, easy to use solution for a segregation system at households, so that the wastes can be sent directly for processing. Automatic waste segregator is designed to sort the waste into three main categories namely; metallic, organic and plastic, thereby making the waste management more effective. Ultrasonic sensors are added for monitoring waste collection process. The sensors would be placed in all the garbage bins. When the garbage reaches the level of the sensor, then the indication will be given to a microcontroller. The microcontroller will give indication to the driver of garbage collection truck by sending SMS using GSM technology.

Keywords: Automatic waste segregator, waste management, microcontroller, SMS, GSM

1. INTRODUCTION

In India about 60 thousand tonnes of waste is being generated every year at Salem corporation. Ten thousand tonnes of garbage is generated in metropolitan cities. The landfills of most of these cities are overflowing with no space for fresh garbage waste. The philosophy of "waste management hierarchy" has been adopted by most nations as the step for developing municipal solid waste (MSW) management strategies.

According to a sanitation survey called "Swachh Survekshan-2017" conducted by the ministry of urban development under the swachh bharat mission, it was found that about 50% people in India face the problem of improper waste collection and management. According to centre of science and environment, innovative disposal and recycling methods must be introduced instead of landfill sites.

2. MOTIVATION

we have proposed a cost effective "Automatic waste segregator and monitoring system" for proper management of waste. Automatic waste segregator categorizes the waste as plastic, metallic or organic. The monitoring system helps to monitor the waste collection process. The common method of waste disposal is by unplanned and uncontrolled dumping at landfill areas. This method is hazardous to human health, plant and animal life. When the waste is segregated into basic streams such as plastic, metallic and organic, the waste has a higher potential of recovery, and

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then, recycled and reused. The organic waste is converted either into compost or methane-gas or both. Compost can replace demand for chemical fertilizers, and biogas can be used as a source of energy. The metal waste could be reused or recycled. Even if there are large scale industrial waste segregators present, it is always feasible to separate the waste at the source itself. The benefit of doing so is that the occupational hazard for waste workers is reduced. Also, the separated waste could be directly sent to the recycling and processing plant instead of sending it to the segregation plant then to the recycling plant.

3. WORKING

The whole system is controlled by an Arduino Uno board. All other parts like ultrasonic sensors, inductive proximity sensor, DC motors, blower and electromagnet are interfaced to the Arduino board. The open close mechanism acts as a regulator to control the waste that falls on the belt. A 12 V DC geared motor receives inputs from microcontroller to monitor the clockwise and anti-clockwise motion of the motor. As motor rotates, the rotary motion is translated to linear motion using a rack and pinion arrangement. L293D is used as the motor driver IC to provide the necessary current to the motor. This mechanism is initiated only if the ultrasonic sensor at the inlet detects a waste.It carries the waste from inlet to outlet sections. Four 12 V DC geared motors are used to move the belt. Inductive proximity sensor based on the eddy current principle is fixed in the inlet part to identify the presence of metals in the waste. The NPN sensor gives a logical 0 output in the presence of metal and logical 1 output in the absence of metal. This is fed as input to the microcontroller.A motor takes electrical energy and converts into mechanical energy. A geared DC motor has a gear assembly attached to the motor. The speed of motor is counted in terms of rotations of the shaft per minute and is termed as RPM. The gear assembly helps in increasing the torque and reducing the speed. Using the correct combination of gears in a gear motor, its speed can be reduced to any desirable figure. This concept where gears reduce the speed of the vehicle but increase its torque is known as gear reduction. The DC motor works over a fair range of voltage. The higher the input voltage more is the RPM (rotations per minute) of the motor. For example, if the motor works in the range of 6–12 V, it will have the least RPM at 6 V and maximum at 12 V. The blower separates plastic or paper wastes which are light weight. Dry and wet separation is based on their weight. Due to its high density and weight, wet waste refuses to be blown off even in the presence of a high speed blower. This technique is used to distinguish wet and dry waste. A relay will control the on and off of a high speed AC Blower. As blower blows, the belt stops and dry waste is thrown out into the dry bin. Wet waste stays on the belt. It then falls off due to gravity at the end of the belt as it rolls.Metal wastes are separated by a robotic arm with an electromagnet fixed on the arm. Robotic arm delivers fast, accurate, and repeatable movement. The robot features are: base rotation, single plane shoulder. When the metal is detected by the inductive proximity sensor, the conveyor belt stops. Control signal is given to robotic arm to extract the metal by the electromagnet attached to it and then turn around 180° and drop the metal particles into a bin. Robotic arm moves with the help of two 12 V geared DC motors.An electromagnet is a device used to generate a magnetic field with the help of an electric current. Electromagnet usually consists of a large number of closely spaced turns of wire that create the magnetic field. The wire turns are often wound around a magnetic core made from a ferromagnetic or ferromagnetic material such as iron; the magnetic core concentrates the magnetic flux and makes a more powerful magnet. The main advantage of an electromagnet over a permanent magnet is that the magnetic field can be quickly changed by controlling the amount of electric

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current in the winding. Ultrasonic sensor is fixed in the inlet part so as to detect the falling of waste. The trigger pulses are provided for ultrasound detection of waste. The echo received from the waste is received by the microcontroller to calculate the delay. Ultrasonic sensors will also be placed on every outlet bins (metal bin, plastic bin, organic bin) to check whether they are filled or not. Whenever any of the bins are filled, corresponding information will be given to the monitoring system by a GSM module through short message service (SMS).

4. ADVANTAGE OF THIS PROJECT

- Sorting of waste at the primary stage will make the waste management more effective and fruitful.
- The dustbins are cleared as and when they are filled, thus giving way to a cleaner environment.
- Eco friendly system.
- Lower initial investment including lower cost of installation

5. CONCLUSION

An automatic waste segregator (AWS) which is a cheap, easy to use solution for a segregation system at households, so that the wastes can be sent directly for processing. Automatic waste segregator is designed to sort the waste into three main categories namely; metallic, organic and plastic, thereby making the waste management more effective. Ultrasonic sensors are added for monitoring waste collection process. The sensors would be placed in all the garbage bins. When the garbage reaches the level of the sensor, then the indication will be given to a microcontroller. The microcontroller will give indication to the driver of garbage collection truck by sending SMS using GSM technology.

Guide: Mr.Manivannan, Assistant Professor, Department of ECE, Ganesh College of Engineering, Mettupatty, Salem-636111.

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SALEM-636 111.

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