



# SRI RAAJA RAAJAN

## COLLEGE OF ENGINEERING AND TECHNOLOGY

(Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai)

146/14B1, Amaravathi Village, Amaravathiputhur Post,  
Karaikudi – 630 301, Sivagangai Dt, Tamil Nadu

Website : [www.srirajarajan.in](http://www.srirajarajan.in), E-mail : [srreet2010@gmail.com](mailto:srreet2010@gmail.com), Ph: 04565-234230

### INNOVATIVE PROJECT CELL COMMITTEE 2017 - 2018

DATE : 06.09.2017

Innovative Project cell was formed on 06.09.2017 in Principal room, Sri Raaja Raajan College of Engineering and Technology at 2 PM. The following members were selected for the promotion of the cell with the objectives of guiding the students, enhancing the Skill Development and to carry out the innovative eco-friendly research work.

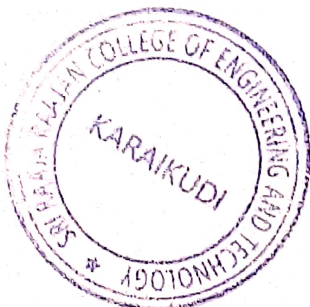
S.NO	NAME	DESIGNATION	SIGNATURE
1	DR .A. KUMARAVADIVEL	PRINCIPAL	
2.	MR.I.RASEED KHAN	HOD/CIVIL	
3	MR. R.SRI JANAKIRAMAN	HOD/ CSE	
4	MR.PL.SUBRAMANIYAN	HOD/ECE	
5	MRS. N.RAJESWARI	HOD/EEE	
6.	DR.HYACINTH SUGANTHI	HOD/MECH	
7.	Mr. M.ASWIN PRAKASH	MECH/STUDENT	
8.	Ms.R. DEEPIKA	EEE/STUDENT	
9	Ms. R. NIVETHA	ECE/STUDENT	
10.	Ms. V.NAVATHARANI	CSE/STUDENT	

#### AGENDA

1. To guide the students towards research and innovation.
2. To enhance the skill development training and self-employment.
3. To carry out innovative eco-friendly research work.

#### MINUTES OF THE MEETING

1. It was resolved for guiding the students towards research and development
2. Resolved to enhance the skill development training and self-employment opportunities.
3. Resolved to identify entrepreneurial opportunities for our students and to encourage ecofriendly research work.



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### INNOVATIVE PROJECT CELL COMMITTEE 2017 - 2018

DATE : 09.10.2017

Innovative Project cell meeting was conducted on 09.10.2017 in Principal room at 2 PM to discuss about the project entitled “PERFORMANCE COMPARISON OF PASSIVE FAULT TOLERANT CONTROL STRATEGY WITH PI AND FUZZY CONTROL OF SINGLE – TANK LEVEL PROCESS WITH SENSOR AND SYSTEM FAULT” prepared by MRS. N.RAJESWARI of EEE department. The meeting was convened by the Principal DR. A. KUMARAVADIVEL. The following members attended the meeting.

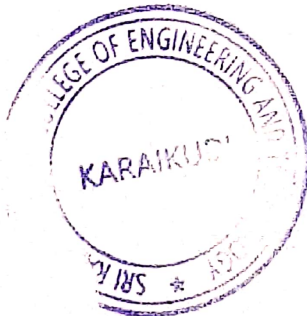
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5	MRS. N.RAJESWARI	HOD/EEE	
6.	DR.HYACINTH SUGANTHI	HOD/MECH	
7.	Ms. R.DEEPIKA	EEE/STUDENT	

#### AGENDA

1. To discuss about the main objective of the project.
2. To discuss about the budget of the proposal.
3. To discuss about the expected outcome of the project

#### MINUTES OF THE MEETING

1. Resolved that objective of the project to be more focused.
2. Resolved that the budget of the proposal is more appropriate.
3. All the possible outcome of the proposal has been discussed elaborately and resolved.



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### INNOVATIVE PROJECT CELL COMMITTEE 2017 - 2018

DATE : 10.10.2017

Innovative Project cell meeting was conducted on 10.10.2017 in Principal room at 2 PM to discuss the project entitled “**PERFORMANCE COMPARISON OF PASSIVE FAULT TOLERANT CONTROL STRATEGY WITH PI AND FUZZY CONTROL OF SINGLE – TANK LEVEL PROCESS WITH SENSOR AND SYSTEM FAULT**” prepared by MRS. N.RAJESWARI of EEE department. The meeting was convened by the Principal DR. A. KUMARAVADIVEL. The following members attended the meeting.

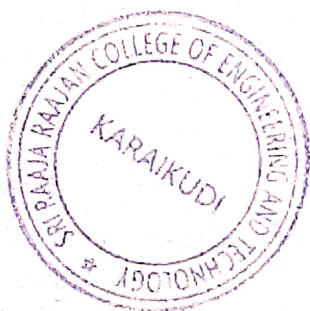
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6.	DR.HYACINTH SUGANTHI	HOD/MECH	
7.	Ms. R.DEEPIKA	EEE/STUDENT	

#### AGENDA

1. To discuss about the performance of fuzzy PID controller for single tank system.
2. To discuss about the programming structure using MAT LAB.
3. To discuss about outcome of the project.

#### MINUTES OF THE MEETING

1. Resolved to promote the most efficient techniques of fuzzy PID controller for single tank system.
2. Resolved to develop the programming structure.
3. Resolved to enhance computing methods.
4. The committee resolved and appreciated all the aspects of enhancement of proposal towards the societal aspect.



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## Abstract:

This report presents a performance comparison of passive fault-tolerant control strategies with Proportional-Integral (PI) and Fuzzy Control applied to a single-tank level process. The objective is to evaluate the control system's ability to maintain the desired liquid level under sensor and system faults. The study investigates how each control strategy responds to these faults and measures their performance in terms of stability, disturbance rejection, and fault tolerance.



  
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### Introduction:

The single-tank level process is a common control problem in industrial applications, where maintaining a desired liquid level is crucial for efficient operation. However, this process is susceptible to sensor and system faults, which can lead to inaccurate measurements and potentially destabilize the control system. To address these challenges, various control strategies have been proposed, including passive fault-tolerant control, PI control, and fuzzy control. This report aims to compare their performance under fault conditions and assess their effectiveness in mitigating faults.

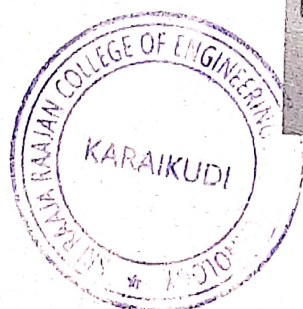
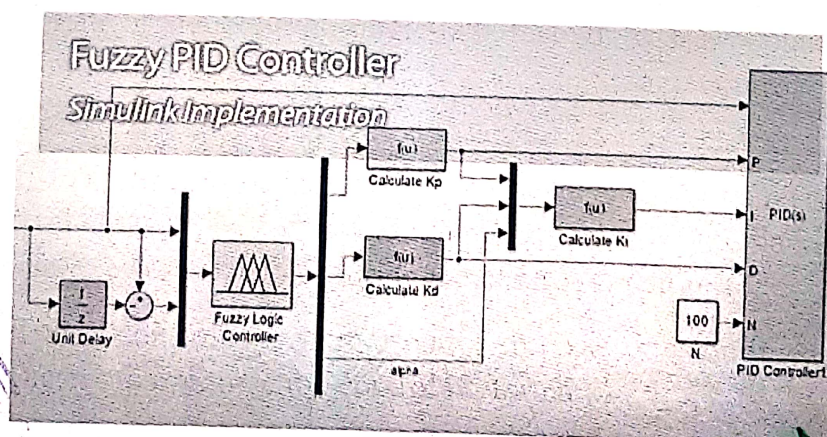
### Methodology:

**Mathematical model of the single-tank level process:** A detailed description of the single-tank level process's dynamics and control equations is presented.

**Passive fault-tolerant control strategy:** The implementation of a passive fault-tolerant control strategy is explained, highlighting its ability to handle sensor and system faults without reconfiguring the control structure.

**PI control:** The PI control algorithm used for comparison is outlined, including tuning parameters to optimize the control performance.

**Fuzzy control:** The fuzzy control system is designed, including the definition of linguistic variables, fuzzy rules, and the inference mechanism.



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System fault: Simulating changes in system parameters to mimic potential hardware or actuator failures.

### Simulation Setup:

The control strategies are implemented in a simulation environment using software like MATLAB or a similar tool.

Different fault scenarios are applied, and the performance of each control strategy is evaluated based on various metrics.

### Performance Metrics:

Settling time: Time taken by the control system to stabilize the liquid level after a setpoint change.

Overshoot: Maximum deviation of the liquid level from the desired setpoint before reaching stability.

Integral of Absolute Error (IAE): Integral of the absolute value of the error signal over time, measuring overall control performance.

Fault detection and accommodation: Ability to detect and mitigate faults without significantly affecting the process.

### Results and Discussion:

The performance metrics for each control strategy under normal and fault conditions are presented and analysed.

Comparative analysis of passive fault-tolerant control, PI control, and fuzzy control strategies.

Discussion on the strengths and weaknesses of each strategy concerning fault tolerance and disturbance rejection.

### Conclusion:

Summary of the study's findings and implications for practical applications.

Recommendations for selecting an appropriate control strategy for the single-tank level process based on fault tolerance requirements.

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E-mail : srrcet2010@gmail.com  
Website: www.srirajaraajan.in

Date :

### Quotation

Sl.No	Items	Price
	<b>Front Wheel Assembly Work</b>	
1.	1" 2 Turbine flow meter	15000
2.	1" 2 Solenoid valve	3000
3.	sensors	3500
4.	500 liter tank 2	5000
5.	1" GA Pipe 2 length	1500
6.	1" bend 10	1000
7.	Threading	300
8.	1 HP motor	2500
9.	MAT Lab interfacing module	10000
	<b>TOTAL</b>	<b>41800</b>

This project was funded by our management.



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Ph : 04565 – 234230, Mobile : 73737 11343, 73737 11339, 73737 11322



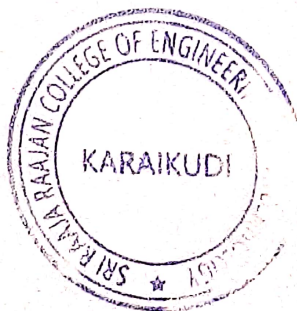
**HANDLING STAFF:**

MRS. N.RAJESWARI HOD/EEE

MR.G.KARTHIKEYAN AP/EEE

**NAME LIST OF THE STUDENTS**

S.NO	STUDENT NAME	REGISTER NUMBER	DEPARTMENT	SIGNATURE
1	ARUNKUMAR M	912518114003	S&H	Arunkumar M.
2	DEEPAK P	912518114004	S&H	Deepak P.
3	EDWIN S	912518114005	S&H	Edwin S.
4	AJAY R	912518106001	S&H	Ajay R.
5	HARISHKUMAR K	912518114007	S&H	Harishkumar K.
6	JEEVA FELIX A	912518114008	S&H	Jeeva Felix A.
7	KARTHICK S	912518114009	S&H	Karthick S.
8	KARTHICK XAVIER V	912518114010	S&H	Karthick Xavier V.
9	RAMBA G	912518106014	S&H	Ramba G.
10	KAVIKUMAR C	912518114012	S&H	Kavikumar C.
11	KUMARESAN G	912518114013	S&H	Kumaresan G.
12	LOGESHWARAN K	912518114015	S&H	Logeshwaran K.
13	VIDHYA C	912518106018	S&H	Vidhya C.
14	MOHAMED ALI I	912518114017	S&H	Mohamed Ali I.
15	MOHAMED FAREK N	912518114018	S&H	Mohamed Farek N.
16	MOHAMED IDRISH A	912518114020	S&H	Mohamed Idrish A.
17	LINGARAJAN K	912518106009	S&H	Lingarajan K.
18	NAGASIVAM V	912518114025	S&H	Nagasivam V.
19	NAVEEN N	912518114026	S&H	Naveen N.
20	SHELCIYA S	912518106016	S&H	Shelciya S.



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### INNOVATIVE PROJECT CELL COMMITTEE 2018 - 2019

DATE : 17.10.2018

Innovative Project cell was formed on 17.10.2018 for the academic year 2018-2019 in Principal room, Sri Raaja Raajan College of Engineering and Technology at 2 PM. The following members were selected for the promotion of the cell with the objectives of guiding the students, enhancing the Skill Development and to carry out the innovative eco-friendly research work.

S.NO	NAME	DESIGNATION	SIGNATURE
1	DR .A. KUMARAVADIVEL	PRINCIPAL	
2.	MR.I.RASEED KHAN	HOD/CIVIL	
3	MR. R.SRI JANAKIRAMAN	HOD/ CSE	
4	MR.PL.SUBRAMANIYAN	HOD/ECE	
5	MRS. N.RAJESWARI	HOD/EEE	
6.	DR.HYACINTH SUGANTHI	HOD/MECH	
7	DR.R.MEENA DEVI	ASP/CHEM	
8.	MS.R.NIVETHA	MECH/STUDENT	
9.	MR.M.SATHIYA BIRLA	EEE/STUDENT	
10	MS.SUGANTHI	ECE/STUDENT	
11.	MS.M.MADHUMITHA	CSE/STUDENT	
12	MR.MOHAMMED USMAN	CIVIL/ STUDENT	

#### AGENDA

1. To guide the students towards research and innovation.
2. To enhance the skill development training and self-employment.
3. To carry out innovative eco-friendly research work.

#### MINUTES OF THE MEETING

1. It was resolved for guiding the students towards research and development
2. Resolved to enhance the skill development training and self-employment opportunities.
3. Resolved to identify entrepreneurial opportunities for our students and to encourage ecofriendly research work.



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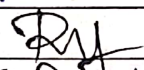
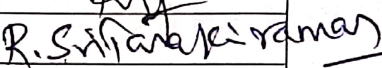
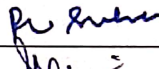
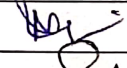
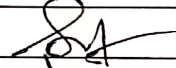

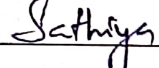
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### INNOVATIVE PROJECT CELL COMMITTEE 2018 - 2019

DATE : 02.11.2018

Innovative Project cell meeting was conducted on 02.11.2018 in Principal room at 2 PM to discuss about the project entitled **“MODIFIED TRACTOR FOR MULTIPURPOSE AGRICULTURAL UTILITIES”** prepared by MRS. N.RAJESWARI of EEE department. The meeting was convened by the Principal DR. A. KUMARAVADIVEL. The following members attended the meeting.

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#### AGENDA

1. To discuss about the main objective of the project.
2. To discuss about the budget of the proposal.
3. To discuss about the expected outcome of the project

#### MINUTES OF THE MEETING

1. Resolved that objective of the project to be more focused.
2. Resolved that the budget of the proposal is more appropriate.
3. All the possible outcome of the proposal has been discussed elaborately and resolved.



  
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### INNOVATIVE PROJECT CELL COMMITTEE 2018 - 2019

DATE : 13.11.2018

Innovative Project cell meeting was conducted on 13.11.2018 in Principal room at 2 PM to discuss the project entitled “MODIFIED TRACTOR FOR MULTIPURPOSE AGRICULTURAL UTILITIES” prepared by MRS. N.RAJESWARI of EEE department. The meeting was convened by the Principal DR. A. KUMARAVADIVEL. The following members attended the meeting.

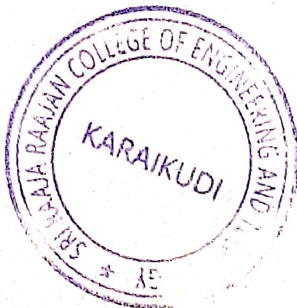
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7.	DR.R.MEENA DEVI	ASP/CHEM	
8	MR.M.SATHIYA BIRLA	EEE/STUDENT	

#### AGENDA

1. To reduce the human efforts in farming of crops.
2. To discuss about the designing of modified tractor for multipurpose agricultural utilities.
3. To discuss about outcome of the project.

#### MINUTES OF THE MEETING

1. Resolved to accept the concept of minimizing man power.
2. Resolved to promote the most efficient technique and improve its functionality.
3. Resolved to enhance agricultural applications.
4. The committee resolved and appreciated all the aspects of enhancement of proposal towards the societal aspect.



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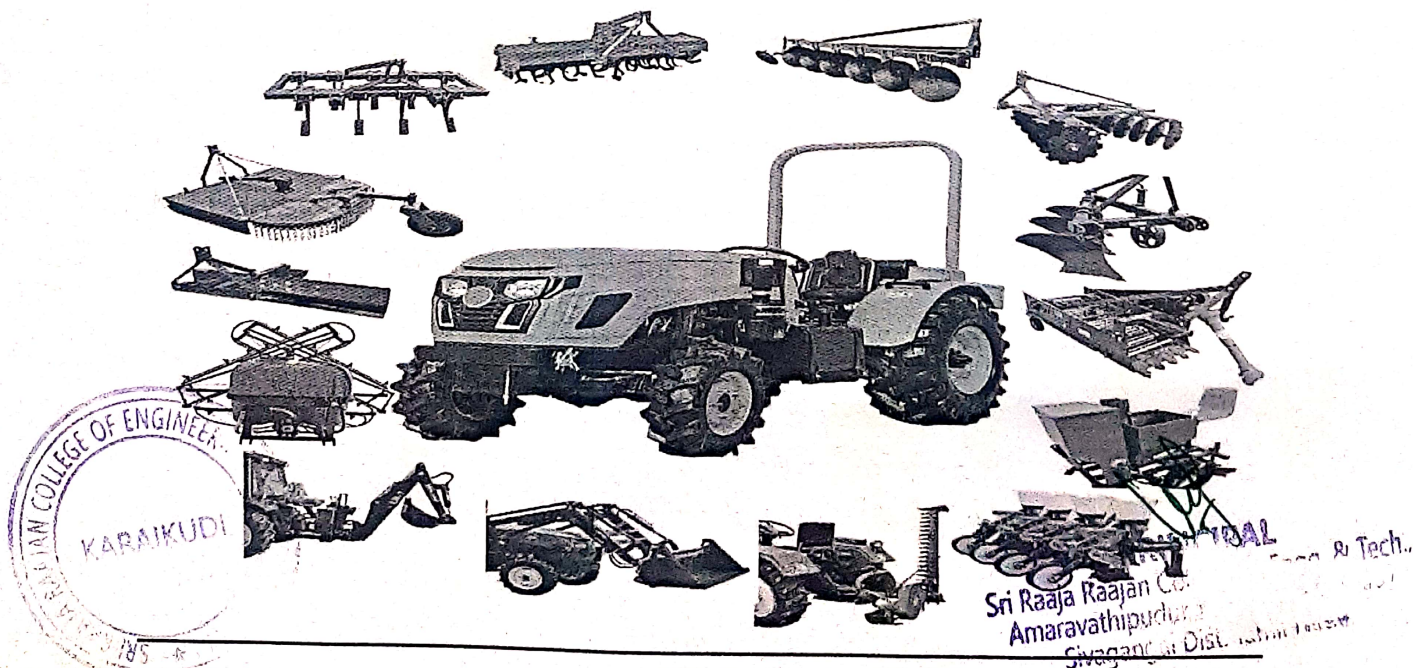
### 1.Introduction

The following report details the modifications made to a conventional tractor to transform it into a versatile and efficient multipurpose agricultural utility vehicle. The aim of this project was to enhance the tractor's capabilities and adapt it to meet various agricultural needs, thereby improving productivity and reducing operational costs.

### 2.Objectives

The key objectives of the modified tractor project were as follows:

- Increase versatility: Enable the tractor to perform multiple tasks in different agricultural operations.
- Enhance efficiency: Improve fuel efficiency, power output, and overall performance.
- Reduce environmental impact: Incorporate eco-friendly features to minimize the tractor's carbon footprint.
- Improve safety: Implement safety enhancements for operators and bystanders







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### 3. Modifications Implemented

The modifications were carried out systematically, incorporating the latest technologies and design principles. The key modifications are as follows:

#### a) Powertrain Enhancement:

Engine Upgrade: Replaced the stock engine with a more powerful and fuel-efficient engine, matched to the tractor's new capabilities.

Transmission System: Installed a modern transmission system to optimize gear ratios for various agricultural tasks, leading to improved fuel efficiency and performance.

#### b) Implement Compatibility:

Universal Hitch: Designed and integrated a universal hitch system that allows quick and easy attachment of a wide range of agricultural implements, such as plows, harrows, seeders, and cultivators.

Hydraulic System: Upgraded the hydraulic system to accommodate the diverse needs of different implements, providing efficient control and precise operation.

#### c) Electrical System:

Integrated Electronics: Incorporated a modern electrical system to enable electronic control of various tractor functions, leading to better automation and ease of use.

LED Lighting: Replaced traditional lighting with energy-efficient LED lights to reduce power consumption and enhance visibility during low-light conditions.

#### d) Multi-Terrain Adaptability:

Adjustable Suspension: Installed an adjustable suspension system to adapt to various terrains, providing better stability and operator comfort.



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All-Terrain Tires: Equipped the tractor with specially designed all-terrain tires to improve traction and reduce soil compaction.

### e) Environmental Considerations:

Emissions Control: Implemented exhaust after-treatment systems, such as selective catalytic reduction (SCR) or diesel particulate filters (DPF), to reduce harmful emissions and comply with environmental regulations.

Biofuel Compatibility: Modified the engine to be compatible with biofuels, providing an eco-friendly alternative to fossil fuels.

### f) Operator Safety:

Rollover Protection System (ROPS): Installed a ROPS structure to protect the operator in the event of a rollover accident.

Operator Feedback: Integrated sensors and indicators to provide real-time feedback on tractor performance and safety aspects.

## **4. Performance and Benefits**

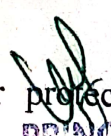
The modified tractor demonstrated significant improvements in performance and benefits:

Increased Versatility: The tractor's ability to quickly switch between implements resulted in improved efficiency and time savings during various agricultural tasks.

Enhanced Efficiency: The upgraded powertrain and transmission led to better fuel efficiency, reducing operational costs for farmers.

Eco-Friendly: By incorporating emission control systems and biofuel compatibility, the tractor contributed to reduced environmental impact and sustainable agricultural practices.

Safety Upgrades: The added safety features enhanced operator protection, reducing the risk of accidents and injuries.

  
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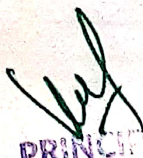
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## Conclusion

The modifications performed on the tractor successfully transformed it into a highly versatile, efficient, and eco-friendly multipurpose agricultural utility. The project achieved its objectives of increasing productivity, reducing environmental impact, and enhancing operator safety. With these improvements, the modified tractor is poised to revolutionize modern farming practices and support the global agricultural community in a sustainable manner.



  
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E-mail : srrcet2010@gmail.com  
Website: www.srirajaraajan.in

Date :

### Quotation

#### Modified tractor for Multipurpose Agricultural Utilities

Sl.No	Items	Price (RS)
<b>Front Wheel Assembly Work</b>		
1.	4 Wheels including transportation cost	1,23,000
2.	Straight Front Bar including welding and Lathe work	12,000
3.	sub axial pipe	10,000
4.	2 Sub axial	8,000
5.	2 Front wheel Hub	12,000
6.	2 Treast Bearing	2000
7.	2 Hub inner Bearing	2200
8.	2 Hub outer Bearing	2800
9.	2 Oil Seal	400
10.	Moon lock for Sub Axial	50
11.	2 Arm rubber	60
12.	8" 18mm TVS bolt nut 6	1000
13.	Arm (Right side and Left side)	7000
14.	Grease 2 Kg	800
15.	Small Extension link (Front Wheel Alignment)	3500
16.	4 End for Small Extension link	2500
17.	Tractor front wheel bolt nut	1200
<b>Power Steering Conversion</b>		
18.	Double Door Demand Box	5500
19.	2 Dowdy pump	9000
20.	Oil Seal for belt pulley	100
21.	2 Cir clip	120
22.	2 Dowdy pump Bearing	1000
23.	Hydraulic steering controller box	15000
24.	Steering rod assembly	2500
25.	Steering disk	1500
26.	Pipe to carry oil (pump to controller)	7000
27.	Hose to carry oil ( controller to cylinder)	4500
28.	BSB link in controller	1500
29.	Hydraulic cylinder	7000
<b>Back Wheel Assembly Work</b>		
30.	2 Pipe Work for Extension	12,000
31.	Tractor Back wheel bolt nut	1800
<b>Tractor Bed Assembly Work</b>		
32.	Hydraulic bed shaft Extension	3000
33.	Hydraulic top link	5000
34.	Hydraulic bed ball link	3500
35.	<b>TOTAL</b>	<b>2,68,580</b>

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Date :

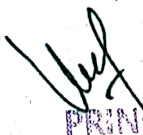
### Quotation

#### Tractor PTO operated Pesticide Sprayer

Sl.No	Items	Price
	Front Wheel Assembly Work	
1.	1000 liter square tank	6000
2.	2 spray gun system	35000
3.	High pressure water pump	18000
4.	9" 2 belt pulley	3500
5.	6" 2 belt pulley	2500
6.	2 belt (Fenner)	3500
7.	PTO outer joint with star head	4500
8.	PTO inner joint with star head	4500
9.	2 Bearing	3000
10.	9" Pulley Shaft	3000
11.	Tank carrier setup with 4 stands	20000
	TOTAL	103500

This project was funded by our management.



  
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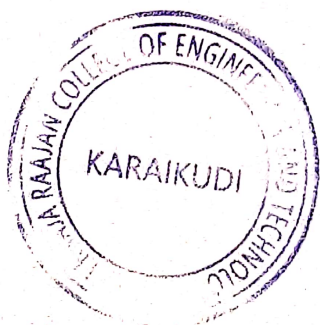
**HANDLING STAFF:**

MRS. N.RAJESWARI HOD/EEE

MR.S.GOMATHISANKAR AP/EEE

**NAME LIST OF THE STUDENTS**

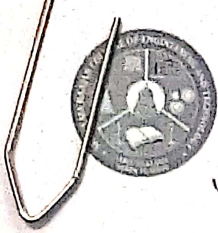
S.NO	STUDENT NAME	REGISTER NUMBER	DEPARTMENT	SIGNATURE
1	ABINAYA	912519106001	S&H	Abinaya
2	ANITHA	912519106002	S&H	Anitha
3	ARUNADEVI	912519106003	S&H	Arunadevi
4	CHARULATHA	912519106004	S&H	Charulatha
5	DHARANI	912519106005	S&H	Dharani
6	DISOSAM	912519106006	S&H	Disosam
7	GAYATHIRI	912519106007	S&H	Gayathiri
8	GOVINDHU	912519106008	S&H	Govindhu
9	JANANI	912519106009	S&H	Janani
10	KARTHIKA	912519106011	S&H	Karthika
11	MAHALAKSHMI	912519106012	S&H	Mahalakshmi
12	NIVETHA	912519106013	S&H	Nivetha
13	PANDIARASI	912519106014	S&H	Pandiarasi
14	SUBASOWKIYA	912519106015	S&H	Subasowkiya
15	SUSMA	912519106016	S&H	Susma
16	VASANTHAKUMAR	912519106017	S&H	Vasanthakumar
17	VEERADURGA	912519106019	S&H	Veeradurga
18	VIBINESHNAN	912519106020	S&H	Vibineshnan
19	VINOSHIKA	912519106021	S&H	Vinoshika
20	VIGNESH	912519106023	S&H	Vignesh

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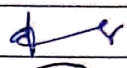

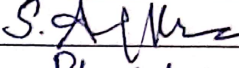
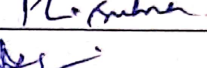
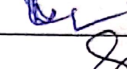
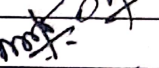
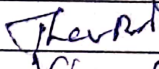
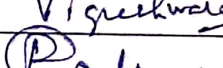
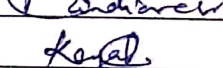
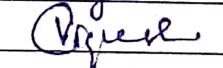


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### INNOVATIVE PROJECT CELL COMMITTEE 2019 - 2020

DATE: 20.09.2019

Innovative Project cell was formed on 20.09.2019 for the academic year 2019-2020 in Principal room, Sri Raaja Raajan College of Engineering and Technology at 2 PM. The following members were selected for the promotion of the cell with the objectives of guiding the students, enhancing the Skill Development and to carry out the innovative eco-friendly research work.

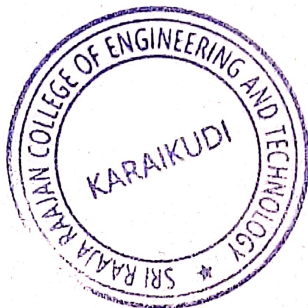
S.NO	NAME	DESIGNATION	SIGNATURE
1	DR .A. KUMARAVADIVEL	PRINCIPAL	
2.	MR.I.RASEED KHAN	HOD/CIVIL	
3	MR. S.AANJAN KUMAR	HOD/ CSE	
4	MR.PL.SUBRAMANIYAN	HOD/ECE	
5	MRS. N.RAJESWARI	HOD/EEE	
6.	DR.HYACINTH SUGANTHI	HOD/MECH	
7.	DR.R.MEENA DEVI	ASP/CHEM	
8.	MR.S. AHAMED THAVBIK	MECH/STUDENT	
9	MR.A.VIGNESWARAN	EEE/STUDENT	
10.	MS. T.PANDIARASI	ECE/STUDENT	
11	MS.K.KAYALVIZHI	CSE/STUDENT	
12	MR.G.VIGNESH	CIVIL/ STUDENT	

#### AGENDA

1. To guide the students towards research and innovation.
2. To enhance the skill development training and self-employment.
3. To carry out innovative eco-friendly research work.

#### MINUTES OF THE MEETING

1. It was resolved for guiding the students towards research and development
2. Resolved to enhance the skill development training and self-employment opportunities.
3. Resolved to identify entrepreneurial opportunities for our students and to encourage eco-friendly research work.



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**INNOVATIVE PROJECT CELL COMMITTEE 2019 - 2020**

DATE: 25.09.2019

Innovative Project cell meeting was conducted on 25.09.2019 in Principal room at 2 PM to discuss about the project entitled “**AUTOMATED DUST BIN USING ARDUINO**” prepared by **MRS. N.RAJESWARI** of EEE department. The meeting was convened by the Principal **DR. A. KUMARAVADIVEL**. The following members attended the meeting.

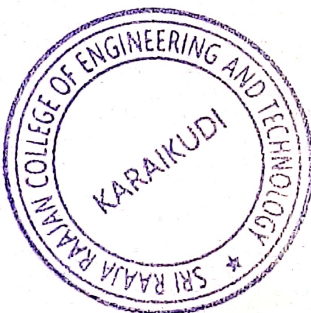
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6.	DR.HYACINTH SUGANTHI	HOD /MECH	
7	DR.R.MEENA DEVI	ASP/CHEM	
8	MR.A.VIGNESWARAN	EEE/STUDENT	

**AGENDA**

1. To discuss about the main objective of the project.
2. To discuss about the budget of the proposal.
3. To discuss about the expected outcome of the project

**MINUTES OF THE MEETING**

1. Resolved that objective of the project to be more focused.
2. Resolved that the budget of the proposal is more appropriate.
3. All the possible outcome of the proposal has been discussed elaborately and resolved.



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DATE : 27.09.2019

Innovative Project cell meeting was conducted on 27.09.2019 in Principal room at 2 PM to discuss the project entitled “AUTOMATED DUST BIN USING ARDUINO” prepared by MRS. N.RAJESWARI of EEE department. The meeting was convened by the Principal DR. A. KUMARAVADIVEL. The following members attended the meeting.

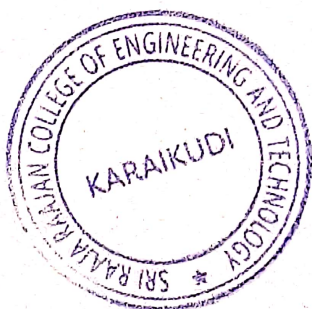
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7	DR.R.MEENA DEVI	ASP/CHEM	
8	MR.A.VIGNESWARAN	EEE/STUDENT	

#### AGENDA

1. To minimize the waste generation in the environment.
2. To discuss about the working model of the smart dustbin.
3. To discuss about outcome of the project.

#### MINUTES OF THE MEETING

1. Resolved to make an evolution changes towards cleanliness.
2. Resolved to support green energy research activities.
3. The committee resolved and appreciated all the aspects of enhancement of proposal towards the societal aspect.



  
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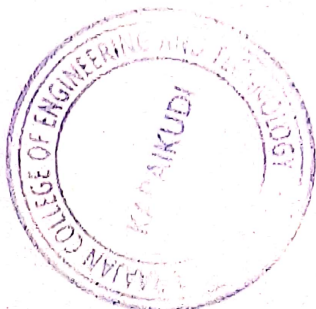
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## Abstract

This report presents the design, implementation, and evaluation of an automated dustbin system using Arduino. The system aims to enhance waste management by automating the process of waste collection, sorting, and disposal. The project utilizes Arduino microcontroller, ultrasonic sensors, servo motors, and a user interface to achieve efficient and user-friendly waste disposal.



  
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### Introduction:

Proper waste management is essential for maintaining a clean and sustainable environment. Traditional dustbins often lead to overflowing and unsorted waste, resulting in increased pollution. The automated dustbin system offers a solution to these challenges by autonomously collecting and sorting waste.

### Objectives:

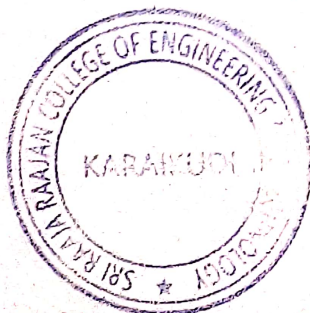
The key objectives of the project are as follows:

Automate waste collection to reduce human intervention. Sort waste into different compartments for recycling and non-recycling materials. Provide a user-friendly interface for monitoring and controlling the system. Optimize power consumption for energy efficiency.

### Materials and Components:

The components used in the project include:

- Arduino UNO microcontroller
- Ultrasonic sensors for distance measurement
- Servo motors for lid opening/closing
- DC motors for waste compartment rotation
- H-bridge motor driver for controlling DC motors
- User interface (LCD display, buttons, or smartphone app)
- Dustbin structure with compartments



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### System Architecture:

The automated dustbin system consists of three main parts: the sensor module, control module, and user interface.

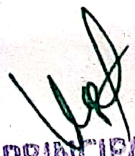
**Sensor Module:** It includes ultrasonic sensors placed on top of the dustbin to detect the distance between the lid and the waste. This information helps in determining if the dustbin is full.



**Control Module:** This part comprises the Arduino microcontroller and H-bridge motor driver. The Arduino receives input from ultrasonic sensors and controls the servo and DC motors to open/close the lid and rotate the compartments for waste sorting.

**User Interface:** A user-friendly interface is provided to monitor the dustbin's status, change settings, and display relevant information.



  
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### Working Principle:

The system works as follows:

Ultrasonic sensors continuously monitor the distance between the waste and the lid. When the dustbin is full, the Arduino triggers the servo motor to open the lid automatically. Once the lid is open, the DC motor rotates the waste compartment to align with the collection area. After waste collection, the DC motor rotates back to its original position, closing the lid. The user interface provides real-time status, allows manual control, and can be used to change system settings.

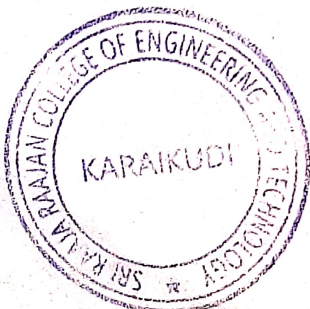
### Implementation and Challenges:

The hardware components are assembled and integrated into the dustbin structure. The Arduino code is programmed to control the various components based on input from ultrasonic sensors and user interface.

Challenges faced during implementation may include accurate sensor calibration, smooth motor movements, power management for prolonged usage, and error handling for unforeseen scenarios.

### Results and Evaluation:

The automated dustbin system provides efficient waste collection and sorting, reducing overflowing bins and encouraging recycling. The user interface simplifies monitoring and control, making it user-friendly. Power optimization ensures extended operational life.



PRINCIPAL

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# SRI RAAJA RAAJAN

COLLEGE OF ENGINEERING AND TECHNOLOGY

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## Conclusion:

The automated dustbin system using Arduino demonstrates an effective and sustainable solution for waste management. It enhances waste collection and sorting processes while promoting a clean and eco-friendly environment.

## Future Scope:

Future improvements could involve incorporating IoT capabilities for remote monitoring, implementing machine learning for intelligent waste sorting, and integrating solar panels for energy self-sufficiency. Additionally, expanding the system to handle multiple bins in smart city environments would further enhance waste management practices.



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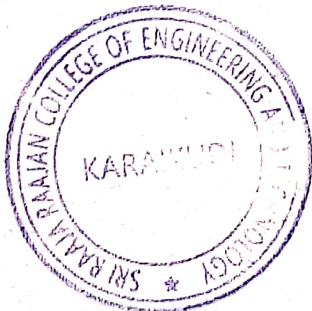
Fax : 04565 – 234430  
Mobile : 73737 11343, 73737 11333  
E-mail : srrect2010@gmail.com  
Website: www.srirajaraajan.in


Date :

### Quotation

SI.NO	LIST OF PRODUCTS	NEED	SINGLE PIECE RATE	TOTAL RATE
1	ARDUINO UNO	1	2,200	2,200
2	ULTRASONIC SENSOR	1	280	280
3.	SG-90 SERVO MOTOR	1	350	350
4.	JUMPER WIRES	10 pieces	250	250
5.	INFRARED SENSOR	1	380	380
6.	LITHIUM ION BATTERY	1	1,700	1,700
			<b>TOTAL</b>	<b>5,160</b>

**This project was funded by our management.**



  
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**Ph :** 04565 – 234230, **Mobile :** 73737 11343, 73737 11339, 73737 11322



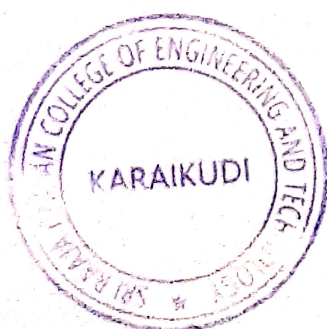
## HANDLING STAFF


MR. T.ROBERT NOBELI BRITTO

MRS. N.VALLIKANNU

## NAME LIST OF THE STUDENTS

S.NO	STUDENT NAME	REGISTER NUMBER	DEPARTMENT	SIGNATURE
1	Abishek Pandiyan	912520103301	S&H	Abishek Pan
2	A.Alexpandiyar	912520103302	S&H	Alexpandiyar
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4	Aravinthan A	912520103304	S&H	Aravindhan
5	Bharathi Ganesan K	912520103307	S&H	Bharathi Ganesan
6	Divakar	912520103308	S&H	Divakar
7	A.Elamugil	912520103309	S&H	Elamugil
8	Ganesh S	912520103310	S&H	Ganesh
9	M.Guru prasath	912520103311	S&H	Guru Prasath
10	Hariharan M	912520103312	S&H	Hariharan
11	Jeganathan AL	912520103313	S&H	Jeganathan
12	Kartheeswaran E	912520103314	S&H	Kartheeswaran
13	Manikandan P	912520103315	S&H	Manikandan
14	Manikandan V	912520103316	S&H	Manikandan
15	P.Mugunthan	912520103317	S&H	Mugunthan
16	A Parasuram	912520103318	S&H	Parasuram
17	Pavithran k	912520103319	S&H	Pavithran
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20	Sreedhar Kumar M	912520103323	S&H	Sreedhar



  
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### INNOVATIVE PROJECT CELL COMMITTEE 2020 - 2021

DATE: 05.10.2020

Innovative Project cell was formed on 05.10.2020 for the academic year 2020-2021 in Principal room, Sri Raaja Raajan College of Engineering and Technology at 2 PM. The following members were selected for the promotion of the cell with the objectives of guiding the students, enhancing the Skill Development and to carry out the innovative eco-friendly research work.

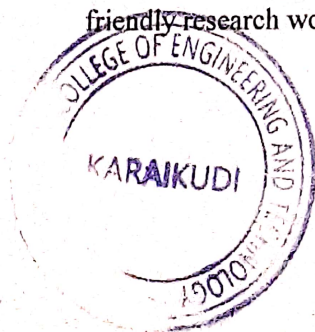
S.NO	NAME	DESIGNATION	SIGNATURE
1	DR .AL.MAYILVAHANAN	PRINCIPAL	
2.	MR.I.RASEED KHAN	HOD/CIVIL	
3	MR. S.AANJAN KUMAR	HOD/ CSE	
4	MR.TN.BALAJI	HOD/ECE	
5	MRS. N.RAJESWARI	HOD/EEE	
6.	MR. R.RAMASAMY	HOD/MECH	
7	DR.R.MEENA DEVI	ASP/CHEM	
7.	MR.T.SELVAMURUGAN	MECH/STUDENT	
8.	MR.U.SANTHOSH KUMAR	EEE/STUDENT	
9	MS. M.ANNAPOORANI	ECE/STUDENT	
10.	MS.K.ATCHAYA	CSE/STUDENT	
11	MR.P.MUKUNTHAN	CIVIL/ STUDENT	

#### AGENDA

1. To guide the students towards research and innovation.
2. To enhance the skill development training and self-employment.
3. To carry out innovative eco-friendly research work.

#### MINUTES OF THE MEETING

1. It was resolved for guiding the students towards research and development
2. Resolved to enhance the skill development training and self-employment opportunities.
3. Resolved to identify entrepreneurial opportunities for our students and to encourage eco-friendly research work.



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### INNOVATIVE PROJECT CELL COMMITTEE 2020 - 2021

DATE: 21.10.2020

Innovative Project cell meeting was conducted on 21.10.2020 in Principal room at 2 PM to discuss about the project entitled “**LOW POWER FM BROADCAST RADIO STATION USING ARDUINO**” prepared by of ECE department. The meeting was convened by the Principal DR. AL. MAYILVAHANAN. The following members attended the meeting.

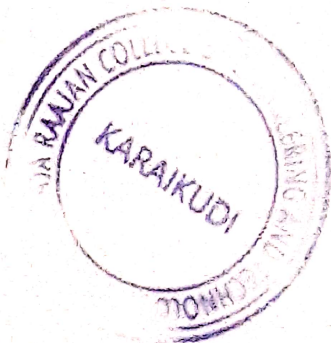
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7.	DR.R.MEENA DEVI	ASP/CHEM	
8.	MS. M.ANNAPOORANI	ECE/STUDENT	

#### AGENDA

1. To discuss about the main objective of the project.
2. To discuss about the budget of the proposal.
3. To discuss about the expected outcome of the project

#### MINUTES OF THE MEETING

1. Resolved that objective of the project to be more focused.
2. Resolved that the budget of the proposal is more appropriate.
3. All the possible outcome of the proposal has been discussed elaborately and resolved.



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## INNOVATIVE PROJECT CELL COMMITTEE 2020 - 2021

DATE: 23.10.2020

Innovative Project cell meeting was conducted on 23.10.2020 in Principal room at 2 PM to discuss the project entitled "LOW POWER FM BROADCAST RADIO STATION USING ARDUINO" prepared by of ECE department. The meeting was convened by the Principal DR. AL. MAYILVAHANAN. The following members attended the meeting.

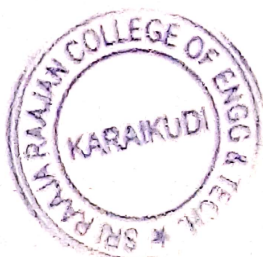
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4	MR. T. N. BALAJI	HOD/ECE	
5	MRS. N. RAJESWARI	HOD/EEE	
6.	MR. R. RAMASAMY	HOD/MECH	
7.	MS. M. ANNAPOORANI	ECE/STUDENT	

### AGENDA

1. To understand about the concept of FM Radio telephone transmitter.
2. To examine the working of a FM radio telephone transmitter.
3. To discuss about outcome of the project.

### MINUTES OF THE MEETING

1. Resolved the concepts of FM Radio telephone transmitter.
2. Resolved to engage the students in research activities.
3. The committee resolved and appreciated all the aspects of enhancement of proposal towards the societal aspect.



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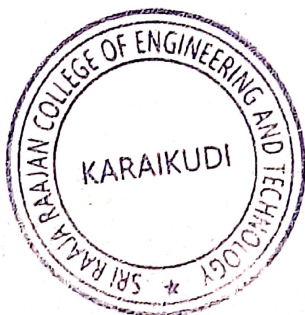
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## Abstract

This report presents the design, implementation, and evaluation of a low-power FM broadcast radio station using Arduino. The project aims to provide an affordable and energy-efficient solution for broadcasting local content within a limited range. By utilizing the Arduino platform, the system achieves simplicity, flexibility, and the ability to be easily adapted for various applications.



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### Introduction:

FM radio broadcasting plays a crucial role in disseminating information and entertainment to local communities. However, traditional FM transmitters can be expensive and consume significant power. The low-power FM broadcast radio station using Arduino offers an alternative approach to provide localized radio coverage with reduced costs and energy consumption.

### Objectives:

The primary objectives of the project are as follows:

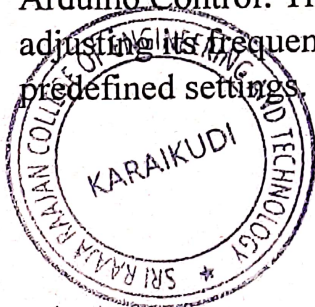
- Design a low-power FM transmitter using Arduino for local broadcasting.
- Achieve efficient power utilization to extend the system's operational life.
- Ensure high-quality audio transmission and reception within the designated range.
- Develop a user-friendly interface for managing broadcasting parameters.
- Materials and Components:
  - The components used in the project include:
    - Arduino board (Arduino Uno or similar)
    - FM transmitter module (based on RDA5807M or similar)
    - Antenna (whip antenna or wire antenna)
    - Audio source (microphone or audio input jack)
    - Power supply (battery or low-power adapter)
    - User interface (LCD display, buttons, or smartphone app)

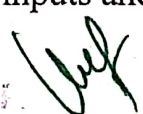
### System Architecture:

The low-power FM broadcast radio station consists of the following modules:

**Audio Input:** The audio source provides the content to be broadcasted, such as live audio from a microphone or pre-recorded audio from an external device.

**Arduino Control:** The Arduino board controls the FM transmitter module, adjusting its frequency and transmitting power based on user inputs and predefined settings.



  
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**FM Transmitter:** The FM transmitter module converts the audio signal into an FM radio signal and broadcasts it through the antenna.

**Antenna:** The antenna radiates the FM signal to a limited range, covering the local vicinity.

### Working Principle:

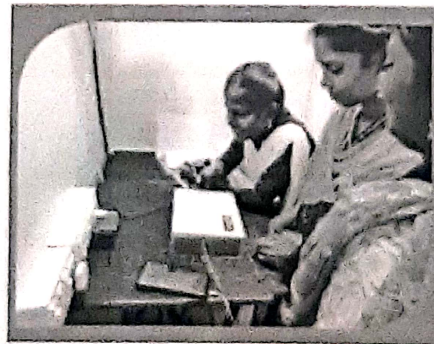
The system operates as follows:

The audio input module captures the audio content and converts it into an analog signal suitable for the Arduino's analog input.

The Arduino reads the audio signal and processes it before feeding it to the FM transmitter module.

The FM transmitter module generates an FM signal with the specified frequency and modulates it with the audio signal.

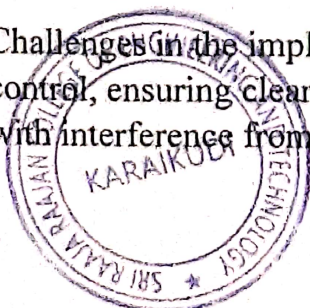
The modulated FM signal is transmitted through the antenna, covering a limited area around the broadcasting station.



### Implementation and Challenges:

The hardware components are connected and programmed on the Arduino platform using suitable libraries. The Arduino code handles audio processing, frequency control, and transmission power adjustment.

Challenges in the implementation may include achieving precise frequency control, ensuring clear audio transmission within the limited range, and dealing with interference from other radio stations.



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### Results and Evaluation:

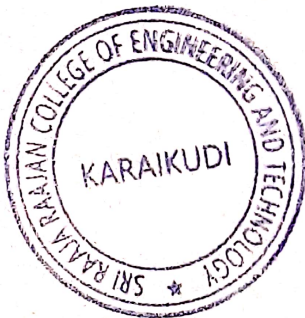
The low-power FM broadcast radio station using Arduino demonstrates efficient broadcasting capabilities with reduced power consumption. The audio quality and range are suitable for localized broadcasting, making it ideal for community-based initiatives.

### Conclusion:

The low-power FM broadcast radio station using Arduino offers an accessible and energy-efficient solution for localized radio broadcasting. Its affordability and simplicity make it a valuable tool for community radio initiatives, educational projects, and events.

### Future Scope:

Future improvements may involve enhancing audio processing for better sound quality, implementing advanced frequency hopping techniques to mitigate interference, and integrating additional features like RDS (Radio Data System) for displaying text information to listeners. Moreover, exploring opportunities for integrating IoT capabilities could enable remote monitoring and control of the broadcasting station.



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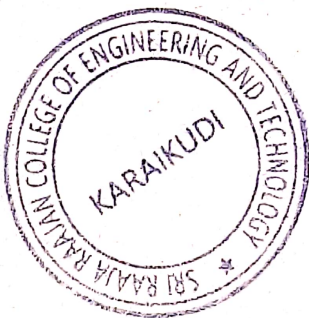
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E-mail : srrcet2010@gmail.com  
Website: www.srirajaraajan.in

### QUOTATION

Date :

S.NO	ITEMS	QUANTITY	PRICE
1	FM TRANSMITTER	1	5000
2	RECEIVER	1	5000
3	UNO-ARDUINO BOARD	1	16,000
4	PCB BOARD	1	3000
5	AMPLIFIES	1	1000
6	SPEAKER	1	1500
7	MICROPHONE	1	500
	TOTAL		32,000

**This project was funded by our management.**



**PRINCIPAL**

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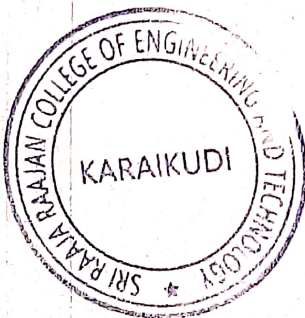




**HANDLING STAFF:**  
MR. TN.BALAJI  
MRS.K.ISABELLARANI

**NAME LIST OF THE STUDENTS**

S.NO	STUDENT NAME	REGISTER NUMBER	DEPARTMENT	SIGNATURE
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2	Abinaya R	912522104002	S&H	Abinaya
3	Abishiek P	912522104003	S&H	Abishiek
4	Adhavan K	912522104004	S&H	Adhavan
5	Athithya M	912522104005	S&H	Athithya
6	Bharath R	912522104006	S&H	Bharath R
7	Chandru S	912522104007	S&H	Chandru S
8	Durga S	912522104008	S&H	Durga S
9	Gayathri T	912522104009	S&H	Gayathri T
10	Harihar S	912522104010	S&H	Harihar S
11	Harish Vishva S	912522104011	S&H	Harish Vishva S
12	Infant Raja S	912522104012	S&H	Infant Raja
13	Janarthanan R	912522104013	S&H	Janarthanan R
14	Jeyapriya G	912522104014	S&H	Jeyapriya
15	Jeevaganthan M	912522104015	S&H	Jeevaganthan
16	Jency A	912522104016	S&H	Jency
17	Josbin Anitha S	912522104017	S&H	Josbin Anitha
18	Kavin S	912522104018	S&H	Kavin
19	Kavi Nesar E	912522104019	S&H	Kavin Nesar E
20	Maithily A	912522104020	S&H	Maithily A



  
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**INNOVATIVE PROJECT CELL COMMITTEE 2021 - 2022**

DATE: 03.02.2021

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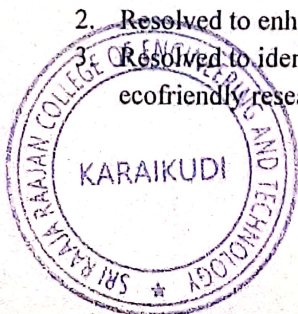
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8.	MS.M.MOUNIKA	EEE/STUDENT	
9	MR. M.KAVIYARASAN	ECE/STUDENT	
10.	MS.K.PALANJAMMAL	CSE/STUDENT	
11	MR.MITHUN CHAKARAVATHI	CIVIL/ STUDENT	

**AGENDA**

1. To guide the students towards research and innovation.
2. To enhance the skill development training and self-employment.
3. To carry out innovative eco-friendly research work.

**MINUTES OF THE MEETING**

1. It was resolved for guiding the students towards research and development
2. Resolved to enhance the skill development training and self-employment opportunities.
3. Resolved to identify entrepreneurial opportunities for our students and to encourage ecofriendly research work.



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**INNOVATIVE PROJECT CELL COMMITTEE 2021 - 2022**

DATE: 05.02.2021

Innovative Project cell meeting was conducted on 05.02.2021 in Principal room at 2 PM to discuss about the project entitled “NON-INVASIVE SINUS DETECTION SYSTEM” prepared by of ECE department. The meeting was convened by the Principal DR. AL. MAYILVAHANAN. The following members attended the meeting.

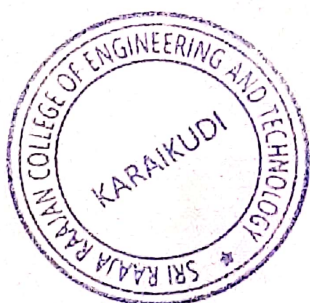
S.NO	NAME	DESIGNATION	SIGNATURE
1	DR .AL.MAYILVAHANAN	PRINCIPAL	
2.	MR.I.RASEED KHAN	HOD/CIVIL	
3	MR. A.AANJAN KUMAR	HOD/ CSE	
4	MR.TN.BALAJI	HOD/ECE	
5	MRS. N.RAJESWARI	HOD/EEE	
6.	MR. R.RAMASAMY	HOD/MECH	
7.	DR.R.MEENA DEVI	ASP/CHEM	
8.	MR. M.KAVIYARASAN	ECE/STUDENT	

**AGENDA**

1. To discuss about the main objective of the project.
2. To discuss about the budget of the proposal.
3. To discuss about the expected outcome of the project

**MINUTES OF THE MEETING**

1. Resolved that objective of the project to be more focused.
2. Resolved that the budget of the proposal is more appropriate.
3. All the possible outcome of the proposal has been discussed elaborately and resolved.



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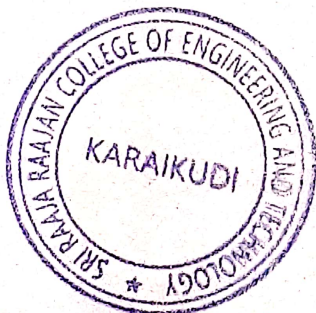
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8.	MR. M.KAVIYARASAN	ECE/STUDENT	

#### AGENDA

1. To accomplish a technique for the detection of sinus disorder using CNN algorithm.
2. To encourage the students in artificial intelligence integration for data analysis.
3. To discuss about outcome of the project.

#### MINUTES OF THE MEETING

1. Resolved the concepts for the detection of sinus disorder using CNN algorithm.
2. Resolved to engage the students in research activities.
3. The committee resolved and appreciated all the aspects of enhancement of proposal towards the societal aspect.



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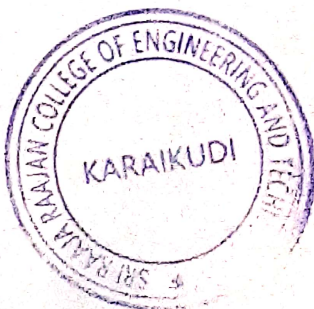
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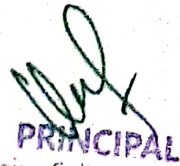
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### Abstract

Discovering the level of sinus at an early stage is an effective way to increase patient health-conscious rate. In this paper, we propose a method of detecting the facial sinusitis in human being (frontal and maxillary) with non-contact measurement. This system enables to analyse and to diagnose the sinus condition with low cost. In order to provide a high accuracy and less time-consuming output we have used CNN algorithm with trained dataset for the classification method using python language. The result shows that the proposed method detects the location of sinus and the percentage of affected sinus. It will be displayed in the system display and also the result will be given to the patient through the web application.



  
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### Introduction

The Non-Invasive Sinus Detection System represents a cutting-edge medical technology designed to revolutionize the diagnosis of sinus conditions. Sinusitis, a prevalent medical issue affecting millions worldwide, often leads to debilitating symptoms, and timely detection is crucial for effective treatment. This report aims to explore the features, benefits, and potential impact of the Non-Invasive Sinus Detection System in the medical field.

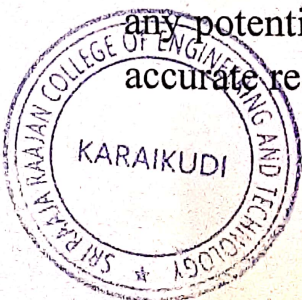
### Background

Sinusitis is a condition characterized by inflammation of the sinuses, typically caused by viral, bacterial, or fungal infections. Traditional diagnostic methods often involve invasive procedures, such as endoscopy or CT scans, which can be uncomfortable, time-consuming, and costly for patients. The Non-Invasive Sinus Detection System aims to address these issues by providing a patient-friendly alternative for accurate and swift diagnosis.

#### How the System Works?

The Non-Invasive Sinus Detection System employs advanced imaging techniques, such as infrared or laser-based technology, to visualize the internal structures of the sinuses without the need for any intrusive procedures. The system can be operated by trained medical personnel and typically follows these steps:

- a. Patient Preparation: The patient is positioned comfortably, and any potential obstructions, such as nasal mucus, are cleared to ensure accurate readings.



*[Signature]*

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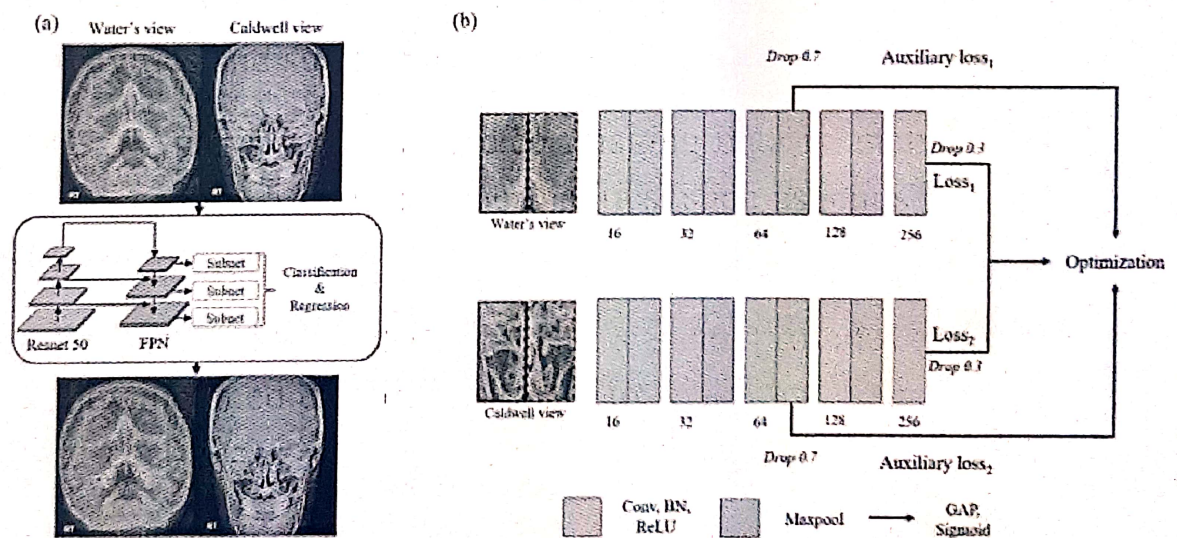
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b. Scanning Process: The system emits safe, low-intensity waves into the nasal cavity, which are then reflected back by the sinus tissues. Based on the collected data, the system generates real-time images of the sinus cavities and surrounding areas.

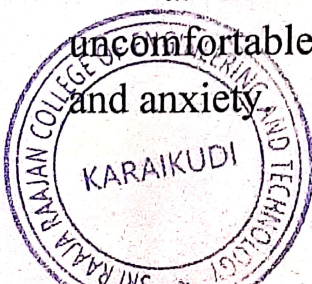
c. Data Analysis: The collected imaging data is analysed using advanced algorithms to detect abnormalities, such as sinus blockages, inflammation, or polyps.

d. Diagnosis and Reporting: The system provides immediate results, allowing medical professionals to make swift and accurate diagnoses, enabling early intervention and personalized treatment plans.



### Benefits of the Non-Invasive Sinus Detection System

a. Non-Invasiveness: The system eliminates the need for uncomfortable and invasive procedures, reducing patient discomfort and anxiety.



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b. Rapid Diagnosis: With real-time imaging and analysis, medical professionals can promptly identify sinus conditions, leading to timely treatment and improved patient outcomes.

c. Cost-Effective: Compared to traditional methods like CT scans or endoscopy, the Non-Invasive Sinus Detection System may offer a more cost-effective alternative for patients and healthcare providers.

d. Reduced Radiation Exposure: Since the system does not utilize ionizing radiation (unlike CT scans), it reduces the potential risks associated with prolonged exposure to radiation.

### Potential Impact

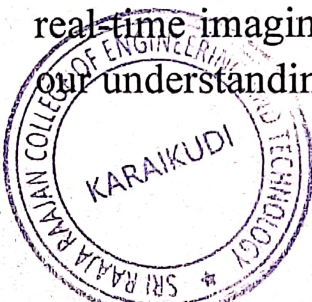
The Non-Invasive Sinus Detection System has the potential to make a significant impact in several areas:

a. Early Detection and Treatment: Swift and accurate diagnosis can lead to early detection and timely treatment, reducing the risk of complications and improving patients' quality of life.

b. Patient Satisfaction: The non-invasive nature of the system can enhance patient satisfaction and compliance with medical recommendations.

c. Healthcare Accessibility: The cost-effectiveness and ease of use of the system may increase accessibility to advanced sinus diagnostics, benefiting both urban and remote areas.

d. Research and Data Collection: The system's ability to provide real-time imaging data can contribute to ongoing research and further our understanding of sinus conditions.



  
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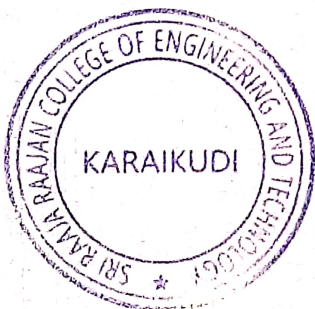
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### Conclusion

The detection and segmentation of sinus is necessary for future treatment purposes. In this project, a method has been proposed to detect the sinus (frontal and maxillary) and the percentage of sinus affected using CNN algorithm. We have proposed a reliable and robust method for sinus detection in highly cluttered images using CNN. The cluttered images are obtained using CT-images. We have introduce a verification step in which the proposed region is classified into maxillary or frontal sinus classes, Thus, determining whether the proposed region is truly affected by sinus or not. Proposed method showing high accuracy and promising result.



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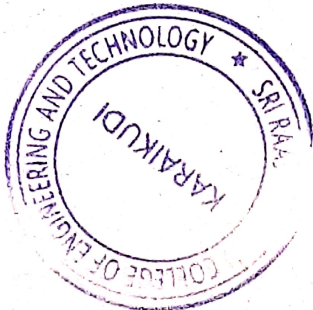
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Date :

## QUOTATION

S.NO	MATERIALS REQUIRED	NEED	TOTAL RATE
1	WEB APPLICATION	1	10000
2	VGG 16 ARCHITECTURE	1	5000
3	CNN ALGORITHM	1	5000
4	TENSOR FLOW	1	2500
5	THONNY IDE	1	2500
	TOTAL		25000

This project was funded by our management.



  
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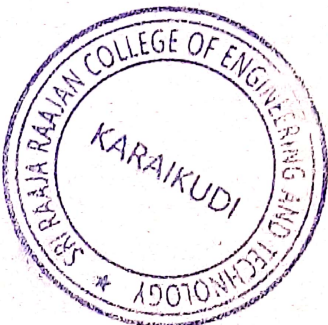
**HANDLING STAFF:**

MR. TN.BALAJI

MRS. K.ISABELLARANI

**NAME LIST OF THE STUDENTS**

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4	Adithya K	912521104004	S&H	Adithya
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6	Arunkumar K	912521104006	S&H	Arunkumar
7	Aswin K	912521104007	S&H	Aswin
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9	Eswari R	912521104010	S&H	Eswari
10	Gayathri K	912521104011	S&H	Gayathri
11	Gopika S	912521104012	S&H	Gopika
12	Harini K	912521104013	S&H	Harini
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15	Kali Thirisha K	912521104018	S&H	Kalithirisha
16	Kannan G	912521104019	S&H	Kannan
17	Kavipriya M	912521104020	S&H	Kavipriya M.
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