



**J.K.K. MUNIRAJAH COLLEGE OF TECHNOLOGY  
(AUTONOMOUS)**

Approved by AICTE, New Delhi And Affiliated to Anna University, Chennai.

Accredited by NAAC with "A" grade

T.N. Palayam (Po), Gobi (Tk), Erode (Dt) – 638 506



**SUMMARY DETAILS OF AVERAGE PERCENTAGE OF GRANTS RECEIVED  
FROM GOVERNMENT / NON GOVERNMENT AGENCIES**

<b>ACADEMIC YEAR</b>	<b>2023-2024</b>
<b>No of departments received research grants</b>	<b>6</b>
<b>Total no of Departments</b>	<b>9</b>
<b>Percentage of departments received research grants</b>	<b>67 %</b>

**PRINCIPAL**

**Principal**  
**J.K.K.Munirajah College of Technology**  
**(Autonomous)**  
**T.N.Palayam, Gobi (Tk),**  
**Erode (Dt) - 638 506**



**J.K.K. MUNIRAJAH COLLEGE OF TECHNOLOGY**  
**(AUTONOMOUS)**

Approved by AICTE, New Delhi And Affiliated to Anna University, Chennai.

Accredited by NAAC with "A" grade



T.N. Palayam (Po), Gobi (Tk), Erode (Dt) – 638 506

2023-2024

Name of the project / Endowments, chairs	Name of the Principal Investigator / Co-Investigator	Department	Year of Award	Amount Sanctioned (INR in lakhs)	Name of the Funding Agency
Digital Privacy and Consent: Ensuring Fair Data Collection and Usage in the IOT	Mr.S.DHARANITHARAN Mrs.V.NIROSHA	CSE	2023-2024	1,12,000	DOTWORLD TECHNOLOGIES PVT LTD
Smart Contracts and Their Role in Legal Automation: A Block Chain Perspective	Mr.S.SUDHAKAR Mr.A.SAMPATH KUMAR	IT	2023-2024	1,25,000	ICORE SOFTWARE TECHNOLOGIES
Design and Development of IOT based Smart Hydroponic Medicinal Plantation	Dr.C.MURUGESAN Mrs.N.GOMATHI	ECE	2023-2024	1,04,000	DIGISCHL CORPORATION
Design and Development and Analysis of Hybrid Composites made up of Conventional and Non-Conventional Fibers for Automobile body Panels	Mr.V.MAGESH Mr.V.P.ARULMURUGAN	AUTO	2023-2024	1,08,500	BHARAT FORGE LIMITED
Reduce Residual Stress and Distortion of Gas Metal arc Welded Joints by Novel Rotating arc Welding Technology	Dr.N.SANKAR	MECH	2023-2024	7,500	TAMILNADU STATE COUNCIL FOR SCIENCE AND TECHNOLOGY
E-Mobility Power Train and Drive Train Test Bench	Dr.C.SARAVANAN Ms.N.MEKALA	EEE	2023-2024	1,52,500	SPAARK TECHNOLOGIES PRIVATE LIMITED

**PRINCIPAL**

**Principal**  
**J.K.K.Munirajah College of Technology**  
**(Autonomous)**  
**T.N.Palayam, Gobi (Tk),**  
**Erode (Dt) - 638 506**



# DOTWORLD TECHNOLOGIES

To

08.08.2023

The principal,  
J.K.K Munirajah College of Technology,  
T.N. palayam,  
Erode - 638506.

Respected Sir,

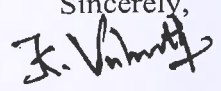
**Sub: Requesting R&D- Collaboration project –Digital Privacy and Consent: Ensuring Fair Data Collection and Usage in the IOT- reg.**

ICORE Software Technologies stands as the No.1 Software Company in Coimbatore. It also aims to make the company much more than an average rural BPO, rather a rurally-grounded innovative business that will continue to offer more services and serve more customers while producing wealth in the Indian rural economy.

In collaboration with an Educational Institution, we are planning to work out the project of 'Digital Privacy and Consent: Ensuring Fair Data Collection and Usage in the IOT'. We like to work this project with collaboration of your Institution. As we are aware of JKK Munirajah college of Technology and faculty members of Information Technology have experience in research related activities.

We are seeking for your positive and earliest reply.

DOTWORLD TECHNOLOGIES PVT. LTD  
No.348, 1A3, Peelamedu,  
Sri Lakshmi Nagar-II,  
Coimbatore, Tamilnadu-641 004.

Sincerely,  
  
Mr.K.VINOTH,  
Senior Manager IT,

  
Principal  
J.K.K.Munirajah College of Technology  
(Autonomous)

T.N.Palayam, Gobi (TK),  
Erode (Dt) - 638 506.

<http://:dotworld.in>



DOTWORLD Technologies pvt ltd.



[hello@dotworld.in](mailto:hello@dotworld.in)



9008605685



**J.K.K.MUNIRAJAH**  
**COLLEGE OF TECHNOLOGY**  
(Approved by AICTE, New Delhi and Affiliated to Anna University, Chennai)  
**(AUTONOMOUS)**

ISO 9001:2015 Certified Institution

Accredited by **NAAC**  
**"A" GRADE**

☎ 02485 260754 / 55  
✉ principal@jkkmct.edu.in  
🌐 www.jkkmct.edu.in

**Smt. VASANTHAKUMARI MUNIRAJAH**  
Chairman & Managing Trustee

**Mrs. M.KASTHURIPRIYA MBA.,**  
Secretary

**DR.K.SRIDHARAN Ph.D.,**  
Principal

**DATE: 15.08.2023**

To

Mr.K.Vinoth  
Senior Manager IT, DOTWORLD Technologies pvt ltd,  
Coimbatore


Respected sir,

**Sub: Research and development collaboration –**


**Reg.Ref: DC/RD/IT/JKKMCT/dated 08.08.2023.**

Good wishes! With immense happiness, we acknowledge your letter dated 08.08.2023 and we very glad and proud to accept your company's project proposal. We are thankful to your peer members for selecting our institution for the funded project. We, the team of J K K Munirajah College of technology have knowledgeable faculty members in academic, research and development areas. We assure that, we will give required technical support for the successful completion of "**Digital Privacy and Consent: Ensuring Fair Data Collection and Usage in the IOT**". We are expecting the specifications, terms and conditions and duration of the projects to proceed further.

We would like to acknowledge that, we have received the project specifications. We have expert faculty members interested to work in the specified area as a team for the proposed project and their profiles have been enclosed. The proposed project is entitled as '**Digital Privacy and Consent: Ensuring Fair Data Collection and Usage in the IOT**' besides, we have also enclosed the Plan of work, financial details and faculty requirements. We also request you to please depute one technical person who can handle the day to day problems of this project for discussion. We are looking forward to explore with you.

  
**Principal**  
**J.K.K.Munirajah College of Techno**  
**(Autonomous)**  
**T.N.Palayam, Gobi (T**  
**Erode (Dt) - 638 5**

With warm wishes,

  
**PRINCIPAL**  
**Principal**  
**J.K.K.Munirajah College of Technology**  
**(Autonomous)**  
**T.N.Palayam, Gobi (Tk),**  
**Erode (Dt) - 638 506.**

Encl:

1. List of faculty members with their profile.
2. Execution plan for project work.
3. Financial details and Facilities required for completion of project.



**J.K.K.MUNIRAJAH**  
**COLLEGE OF TECHNOLOGY**  
(Approved by AICTE, New Delhi and Affiliated to Anna University, Chennai)  
**(AUTONOMOUS)**

ISO 9001:2015 Certified Institution

Accredited by **NAAC**  
**"A" GRADE**

☎ 02485 260754 / 55  
✉ principal@jkkmct.edu.in  
🌐 www.jkkmct.edu.in

**Smt. VASANTHAKUMARI MUNIRAJAH**  
Chairman & Managing Trustee

**Mrs. M.KASTHURIPRIYA MBA.,**  
Secretary

**DR.K.SRIDHARAN Ph.D.,**  
Principal

**DEPARTMENT OF COMPUTER SCIENCE AND**  
**ENGINEERING**


**FACULTY DETAILS**

The following are the faculty members are involved in the project entitled 'Digital Privacy and Consent: Ensuring Fair Data Collection and Usage in the IOT'

S.NO	NAME	DESIGNATION	AREA OF INTEREST
1.	Mr.S.DHARANITHARAN	AP/CSE	AI&ML, Software Engineering, Internet of Things
2.	Mrs.V.NIROSHA	AP/CSE	Internet of Things, Computer Networks, DBMS.

With warm wishes

  
**Principal**  
**J.K.K.Munirajah College of Technol**  
**(Autonomous)**  
**T.N.Palayam, Gobi (Tk),**  
**Erode (Dt) - 638 506**

  
**PRINCIPAL**  
**Principal**  
**J.K.K.Munirajah College of Technology**  
**(Autonomous)**  
**T.N.Palayam, Gobi (Tk),**  
**Erode (Dt) - 638 506.**



**J.K.K.MUNIRAJAH**  
**COLLEGE OF TECHNOLOGY**  
(Approved by AICTE, New Delhi and Affiliated to Anna University, Chennai)  
**(AUTONOMOUS)**

ISO 9001:2015 Certified Institution

Accredited by **NAAC**  
**"A" GRADE**

☎ 02485 260754 / 55  
✉ principal@jkkmct.edu.in  
🌐 www.jkkmct.edu.in

**Smt. VASANTHAKUMARI MUNIRAJAH**  
Chairman & Managing Trustee

**Mrs. M.KASTHURIPRIYA MBA.,**  
Secretary

**DR.K.SRIDHARAN Ph.D.,**  
Principal

**EXECUTION PLAN**

Sl.No	Plan	Duration
1.	Data collection and review	1 month
2.	Prototype development	2 months
3.	Prototype testing	2 months
4.	Software development	3 months
5.	Software testing	1 month
Duration required for completion of the project		9 months

With warm wishes

  
PRINCIPAL

**Principal**

**J.K.K.Munirajah College of Technology**  
(Autonomous)  
T.N.Palayam, Gobi (Tk),  
Erode (Dt) - 638 506.



**Principal**  
**J.K.K.Munirajah College of Technology**  
(Autonomous)  
T.N.Palayam, Gobi (Tk),  
Erode (Dt) - 638 506



**J.K.K.MUNIRAJAH**  
**COLLEGE OF TECHNOLOGY**  
(Approved by AICTE, New Delhi and Affiliated to Anna University, Chennai)  
**(AUTONOMOUS)**

ISO 9001:2015 Certified Institution

Accredited by **NAAC**  
**"A" GRADE**

☎ 02485 260754 / 55  
✉ principal@jkkmct.edu.in  
🌐 www.jkkmct.edu.in

**Smt. VASANTHAKUMARI MUNIRAJAH**  
Chairman & Managing Trustee

**Mrs. M.KASTHURIPRIYA MBA.,**  
Secretary

**DR.K.SRIDHARAN Ph.D.,**  
Principal

**FINANCIAL DETAILS**

S.No	Item Descriptions	Amount
1.	Desktop	16,000
2.	Software	18,000
3.	Hardware	22,000
4.	Transportation	10000
5.	Miscellaneous	12,000
6.	Testing	12,000
7.	Technical Assistant	22,000
	Total	1,12,000

**Principal**  
J.K.K.Munirajah College of Technology  
(Autonomous)  
T.N.Palayam, Gobi (Tk),  
Erode (Dt) - 638 506

With warm wishes

**PRINCIPAL**  
**Principal**  
J.K.K.Munirajah College of Technology  
(Autonomous)  
T.N.Palayam, Gobi (Tk),  
Erode (Dt) - 638 506.



# DOTWORLD TECHNOLOGIES

To

08.09.2023

The principal,  
J.K.K Munirajah College of Technology,  
T.N. palayam,  
Erode - 638506.

Respected Sir,

**Sub:** Approval of budget and execution plan – reg.

We are satisfied with your positive response with reference to the above letter. Our team members thoroughly satisfied with the furnished documents and details that you have sent. The project “**Digital Privacy and Consent: Ensuring Fair Data Collection and Usage in the IOT**” has been accepted. Further, Mr.D.Karan, Data analyzer of our company will get in touch with you regarding prototype development. Expecting for the successful completion of the project.

Principal

J.K.K.Munirajah College of Technology  
(Autonomous)  
T.N.Palayam, Gobi (Tk),  
Erode (Dt) - 638 506.

DOTWORLD TECHNOLOGIES PVT. LTD

No.348, 1A3, Peelamedu,

Sri Lakshmi Nagar-II,  
Coimbatore, Tamilnadu -641 004.

Sincerely,

Mr.K.VINOTH,

Senior Manager IT,

DOTWORLD Technologies pvt ltd.



<http://dotworld.in>



[hello@dotworld.in](mailto:hello@dotworld.in)



9008605685



# J.K.K.MUNIRAJAH

## COLLEGE OF TECHNOLOGY

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

**(AUTONOMOUS)**

Accredited by **NAAC**  
**"A" GRADE**

☎ 02485 260754 / 55  
✉ principal@jkkmct.edu.in  
🌐 www.jkkmct.edu.in

**Smt. VASANTHAKUMARI MUNIRAJAH**  
Chairman & Managing Trustee

**Mrs. M.KASTHURIPRIYA MBA.,**  
Secretary

**DR.K.SRIDHARAN Ph.D.,**  
Principal

**DATE: 06.02.2024**

To

Mr.K.Vinoth  
Senior Manager IT,  
DOTWORLD Technologies pvt ltd,  
Coimbatore.

Dear Sir,

**Sub: Completion of Research project- Reg.**

We are pleased to inform you that, we have successfully completed the project work on **"Digital Privacy and Consent: Ensuring Fair Data Collection and Usage in the IOT"**. Herewith we are sending the modified project source along with the design. We are glad to invite your team to visit the completion of the project in our campus. Hence the project is completed, we request you to please send the amount to "The principal, JKK Munirajah College of Technology"

Looking forward for your response as soon as possible.

**Principal**

**J.K.K.Munirajah College of Technology**  
(Autonomous)  
T.N.Palayam, Gobi (Tk),  
Erode (Dt) - 638 506

With warm wishes

  
6/2/24  
**PRINCIPAL**

**Principal**

**J.K.K.Munirajah College of Technology**  
(Autonomous)  
T.N.Palayam, Gobi (Tk),  
Erode (Dt) - 638 506.



# DOTWORLD TECHNOLOGIES

To

11.03.2024

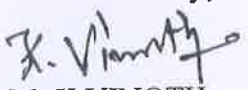
The principal,  
J.K.K Munirajah College of Technology,  
T.N. palayam,  
Erode - 638506.

Respected Sir,

**Sub:** Final Review of Product Design – reg.

In addition to your above reference letter, we are very happy with your research project in question. The members of the peer committee address the work's completion. With respect to the product design and development process, our team members are fully satisfied. If we require any further modification or enhancements, we will intimate you soon. Herewith I am sending the amount Rs 1, 12, 000/-.

**DOTWORLD TECHNOLOGIES PVT. LTD.**  
No.348, 1A3, Peolamedu,  
Sri Lakshmi Nagar-II,  
Coimbatore, Tamilnadu -641 004.

Sincerely,  
  
Mr.K.VINOTH,

Senior Manager IT,

DOTWORLD Technologies pvt ltd.



**Principal**

J.K.K.Munirajah College of Technology  
(Autonomous)  
T.N.Palayam, Gobi (TK),  
Erode (Dt) - 638 506.



hello@dotworld.in



<http://dotworld.in>



9008605685

**DIGITAL PRIVACY AND CONSENT: ENSURING FAIR DATA  
COLLECTION AND USAGE IN THE IOT  
PROJECT PROPOSAL DOCUMENTS**



**COIMBATORE – 641004**

**Done by**

**Mr.S.DHARANITHARAN AP/CSE**

**Mrs.V.NIROSHA AP/CSE**

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**



**2023 – 2024**



**Principal**

**J.K.K.Munirajah College of Technology  
(Autonomous)  
T.N.Palayam, Gobi (Tk),  
Erode (Dt) - 638 506**

## ABSTRACT

The rapid growth of the Internet of Things (IoT) has transformed various industries, enhancing connectivity and enabling smart devices to collect vast amounts of data. However, this proliferation of IoT devices raises significant concerns regarding digital privacy and user consent. As these devices continuously gather personal information, ensuring fair data collection and usage becomes essential to protect individuals' rights. This paper examines the challenges surrounding digital privacy in the context of IoT, focusing on how data is collected, stored, and used by IoT systems. It explores the importance of obtaining informed, explicit consent from users and the need for transparent data management practices. Additionally, the paper discusses existing regulations, such as GDPR, and suggests frameworks for implementing robust privacy protections that empower users to control their data. By balancing innovation with privacy, this work aims to contribute to a more ethical and responsible IoT ecosystem where digital privacy is safeguarded, and data usage is fair and transparent..




Principal


J.K.K.Munirajah College of Technology  
(Autonomous)  
T.N.Palayam, Gobi (Tk),  
Erode (Dt) - 638 506.

**INVOICE**

(Original)

<b>Core Computers</b> 244, 1 <sup>st</sup> Floor, Lakshmi Complex, Nethaji road, Erode. TIN:33422884107 CST:1044986 E-mail:admin@corecom.in		Invoice no.		Dated.		
		1022		22.08.2023		
		Delivery note. -		Mode/Terms of payment: -		
Buyer <b>JKK MUNIRAJAH COLLEGE OF TECHNOLOGY,</b> TN PALAYAM (PO), GOBI (TK), ERODE DT.		Supplier's REF. -		Other Reference's: <b>Ragul</b>		
		Dispatch document no.		Dated.		
		Dispatched through.		Dated.		
		Terms of Delivery.				
S.no	Description of Goods	Quantity	Rate	Per	Disc%	Amount
1	DELL LAPTOP Dell inspiron Laptop5567 i7 7 <sup>th</sup> Gen 16GB 2 TB HDD 15.6 Inch Win10+MSO 4GB Graphics Black	1NOS	38,700.00	NOS	-	40,700.00
2	Working Station Kit	1NOS	15,000.00	NOS	-	15,000.00
	5% - VAT OUT PUT A/C			5 %		2785.00
	<b>TOTAL</b>	2NOS				<b>₹58485.00</b>
Amount Chargeable(in words) <b>Indian Rupees Fifty Eight thousand Four hundred eighty five only</b>						
						
Declaration. We declare that this invoice shows the actual price of the goods described and that all particulars are true And correct.						

This is a Computer Generated Invoice

  
**Principal**  
**J.K.K.Munirajah College of Technology**  
 (Autonomous)  
 T.N.Palayam, Gobi (Tk),  
 Erode (Dt) - 638 506.




# TNR & COMPANY

Chartered Accountants

## UTILIZATION CERTIFICATE

Certified that an amount of Rs. 1, 12,000/- (One Lakh Twelve Thousand Rupees Only) sanctioned during the year 2023-2024 in favour of JKK MUNIRAJAH COLLEGE OF TECHNOLOGY, received from the DOTWORLD TECHNOLOGIES PVT LTD has been utilized for the purpose of Digital Privacy and Consent: Ensuring Fair Data Collection and Usage in the IOT for it was sanctioned and condition of the grants are fulfilled / being fulfilled.


  
PROJECT INVESTIGATOR

  
AUDITOR

  
PRINCIPAL  
Principal

TNR & COMPANY  
Chartered Accountants  
Kooduthurai Main Road,  
T.N. Palayam, Erode - 638 301. (T.N.)  
FRN NO. 0166698

J.K.K. Munirajah College of Technology  
(Autonomous)  
T.N. Palayam, Gobi (Tk),  
Erode (Dt) - 638 506.

  
Principal  
J.K.K. Munirajah College of Technology  
(Autonomous)  
T.N. Palayam, Gobi (Tk),  
Erode (Dt) - 638 506

Bhavani (H.O.)  
94432 60759

Erode (Br)  
90432 50307

Salem (Br)  
90037 12789

Bangalore (Br)  
97894 61632

E-mail : tnroffice@gmail.com

To

10.08.2023

The principal,  
J.K.K Munirajah College of Technology,  
T.N. palayam,  
Erode - 638506.

Respected Sir,


**Sub: Requesting R&D- Collaboration project –Smart Contracts and Their Role in Legal Automation: A Block Chain Perspective- reg.**

ICORE Software Technologies stands as the No.1 Software Company in Coimbatore. It also aims to make the company much more than an average rural BPO, rather a rurally-grounded innovative business that will continue to offer more services and serve more customers while producing wealth in the Indian rural economy.

In collaboration with an Educational Institution, we are planning to work out the project of 'Smart Contracts and Their Role in Legal Automation: A Block Chain Perspective'. We like to work this project with collaboration of your Institution. As we are aware of JKK Munirajah college of Technology and faculty members of Information Technology have experience in research related activities.

We are seeking for your positive and earliest reply.

Sincerely,



Mr. A.PREM KUMAR,

Senior Manager IT,

ICORE Software Technologies.

**ICORE SOFTWARE TECHNOLOGIES**

No.9, Ground Floor,  
Uppilipalayam (Po),  
Coimbatore -641 015.



**Principal**

J.K.K.Munirajah College of Technology  
(Autonomous)  
T.N.Palayam, Gobi (Tk),  
Erode (Dt) - 638 506.



[infosolutions@icore.net.in](mailto:infosolutions@icore.net.in)

**No. 9, Ground Floor, Chennimalai Layout, Andal Nagar,  
Lakshmipuram, Uppilipalayam,  
Coimbatore, Tamil Nadu 641015**



**J.K.K.MUNIRAJAH**  
**COLLEGE OF TECHNOLOGY**  
(Approved by AICTE, New Delhi and Affiliated to Anna University, Chennai)  
**(AUTONOMOUS)**

ISO 9001:2015 Certified Institution

Accredited by **NAAC**  
**"A" GRADE**

☎ 02485 260754 / 55  
✉ principal@jkkmct.edu.in  
🌐 www.jkkmct.edu.in

**Smt. VASANTHAKUMARI MUNIRAJAH**  
Chairman & Managing Trustee

**Mrs. M.KASTHURIPRIYA MBA.,**  
Secretary

**DR.K.SRIDHARAN Ph.D.,**  
Principal

**DATE: 19.08.2023**

To

Mr. A. PREM KUMAR  
Senior Manager IT,  
ICORE Software Technologies,  
Coimbatore.


Respected sir,

**Sub:** Research and development collaboration –

**Reg.Ref:** DC/RD/IT/JKKMCT/dated **10.08.2023.**

Good wishes! With immense happiness, we acknowledge your letter dated 10.08.2023 and we very glad and proud to accept your company's project proposal. We are thankful to your peer members for selecting our institution for the funded project. We, the team of J K K Munirajah College of technology have knowledgeable faculty members in academic, research and development areas. We assure that, we will give required technical support for the successful completion of "Smart Contracts and Their Role in Legal Automation: A Block Chain Perspective". We are expecting the specifications, terms and conditions and duration of the projects to proceed further.

We would like to acknowledge that, we have received the project specifications. We have expert faculty members interested to work in the specified area as a team for the proposed project and their profiles have been enclosed. The proposed project is entitled as "Smart Contracts and Their Role in Legal Automation: A Block Chain Perspective" besides, we have also enclosed the Plan of work, financial details and faculty requirements. We also request you to please depute one technical person who can handle the day to day problems of this project for discussion. We are looking forward to explore with you.

  
**Principal**  
**J.K.K.Munirajah College of Technology**  
(Autonomous)  
**T.N.Palayam, Gobi (Tk),**  
**Erode (Dt) - 638 506**

With warm wishes,

  
**PRINCIPAL**  
**Principal**

Encl:

1. List of faculty members with their profile.
2. Execution plan for project work.
3. Financial details and Facilities required for completion of project.

**J.K.K.Munirajah College of Technology**  
(Autonomous)  
**T.N.Palayam, Gobi (Tk),**  
**Erode (Dt) - 638 506.**



**J.K.K.MUNIRAJAH**  
**COLLEGE OF TECHNOLOGY**  
(Approved by AICTE, New Delhi and Affiliated to Anna University, Chennai)  
**(AUTONOMOUS)**

ISO 9001:2015 Certified Institution

Accredited by **NAAC**  
**"A" GRADE**

☎ 02485 260754 / 55  
✉ principal@jkkmct.edu.in  
🌐 www.jkkmct.edu.in

**Smt. VASANTHAKUMARI MUNIRAJAH**  
Chairman & Managing Trustee

**Mrs. M.KASTHURIPRIYA** MBA.,  
Secretary

**DR.K.SRIDHARAN** Ph.D.,  
Principal

**DEPARTMENT OF INFORMATION**  
**TECHNOLOGY**

**FACULTY DETAILS**

The following are the faculty members are involved in the project entitled 'Smart Contracts and Their Role in Legal Automation: A Block Chain Perspective'

S.NO	NAME	DESIGNATION	AREA OF INTEREST
1.	Mr.S.SUDHAKAR	AP/IT	AI&ML, Block Chain Technologies, Internet of Things
2.	Mr.A.SAMPATH KUMAR	AP/IT	Internet of Things, Computer Networks, DBMS.

With warm wishes

**PRINCIPAL**  
**Principal**

J.K.K.Munirajah College of Technology,  
(Autonomous)  
T.N.Palayam, Gobi (Tk),  
Erode (Dt) - 638 506.

**Principal**  
J.K.K.Munirajah College of Technology  
(Autonomous)  
T.N.Palayam, Gobi (Tk),  
Erode (Dt) - 638 506



**J.K.K.MUNIRAJAH**  
**COLLEGE OF TECHNOLOGY**  
(Approved by AICTE, New Delhi and Affiliated to Anna University, Chennai)  
(AUTONOMOUS)

ISO 9001:2015 Certified Institution

Accredited by **NAAC**  
**"A" GRADE**

☎ 02485 260754 / 55  
✉ principal@jkkmct.edu.in  
🌐 www.jkkmct.edu.in

**Smt. VASANTHAKUMARI MUNIRAJAH**  
Chairman & Managing Trustee

**Mrs. M.KASTHURIPRIYA MBA.,**  
Secretary

**DR.K.SRIDHARAN Ph.D.,**  
Principal

**EXECUTION PLAN**


Sl.No	Plan	Duration
1.	Data collection and review	1 month
2.	Prototype development	2 months
3.	Prototype testing	2 months
4.	Software development	2 months
5.	Software testing	1 month
Duration required for completion of the project		8 months

With warm wishes

  
PRINCIPAL

**Principal**

**J.K.K.Munirajah College of Technology**  
(Autonomous)  
T.N.Palayam, Gobi (Tk),  
Erode (Dt) - 638 506.

  
Principal  
**J.K.K.Munirajah College of Technology**  
(Autonomous)  
T.N.Palayam, Gobi (Tk),  
Erode (Dt) - 638 506



**J.K.K.MUNIRAJAH**  
**COLLEGE OF TECHNOLOGY**  
(Approved by AICTE, New Delhi and Affiliated to Anna University, Chennai)  
**(AUTONOMOUS)**

ISO 9001:2015 Certified Institution

Accredited by **NAAC**  
**"A" GRADE**

☎ 02485 260754 / 55  
✉ principal@jkkmct.edu.in  
🌐 www.jkkmct.edu.in

**Smt. VASANTHAKUMARI MUNIRAJAH**  
Chairman & Managing Trustee

**Mrs. M.KASTHURIPRIYA MBA.,**  
Secretary

**DR.K.SRIDHARAN Ph.D.,**  
Principal

**FINANCIAL DETAILS**

S.No	Item Descriptions	Amount
1.	Desktop	16,000
2.	Software	25,000
3.	Hardware	22,000
4.	Transportation	12000
5.	Miscellaneous	14,000
6.	Testing	14,000
7.	Technical Assistant	22,000
Total		1,25,000

With warm wishes

**Principal**

**J.K.K.Munirajah College of Technology**  
**(Autonomous)**  
**T.N.Palayam, Gobi (Tk),**  
**Erode (Dt) - 638 506**

**PRINCIPAL**

**Principal**

**J.K.K.Munirajah College of Technology**  
**(Autonomous)**  
**T.N.Palayam, Gobi (Tk),**  
**Erode (Dt) - 638 506.**

To

12.09.2023

The principal,  
J.K.K Munirajah College of Technology,  
T.N. palayam,  
Erode - 638506.

Respected Sir,

**Sub:** Approval of budget and execution plan – reg.

We are satisfied with your positive response with reference to the above letter. Our team members thoroughly satisfied with the furnished documents and details that you have sent. The project “**Smart Contracts and Their Role in Legal Automation: A Block Chain Perspective**” has been accepted. Further, Mr.D.Hari, Data analyzer of our company will get in touch with you regarding prototype development. Expecting for the successful completion of the project.



**Principal**

J.K.K.Munirajah College of Technology  
(Autonomous)  
T.N.Palayam, Gobi (Tk),  
Erode (Dt) - 638 506.

**ICORE SOFTWARE TECHNOLOGIES**

No.9, Ground Floor,  
Uppilipalayam (Po),  
Coimbatore -641 015.

Sincerely,



Mr. A.PREM KUMAR,  
Senior Manager IT,  
ICORE Software Technologies.



[infosolutions@icore.net.in](mailto:infosolutions@icore.net.in)

No. 9, Ground Floor, Chennimalai Layout, Andal Nagar,  
Lakshmpuram, Uppilipalayam,  
Coimbatore, Tamil Nadu 641015



**J.K.K.MUNIRAJAH**  
**COLLEGE OF TECHNOLOGY**  
(Approved by AICTE, New Delhi and Affiliated to Anna University, Chennai)  
**(AUTONOMOUS)**

ISO 9001:2015 Certified Institution

Accredited by **NAAC**  
**"A" GRADE**

☎ 02485 260754 / 55  
✉ principal@jkkmct.edu.in  
🌐 www.jkkmct.edu.in

**Smt. VASANTHAKUMARI MUNIRAJAH**  
Chairman & Managing Trustee

**Mrs. M.KASTHURIPRIYA MBA.,**  
Secretary

**DR.K.SRIDHARAN Ph.D.,**  
Principal

**DATE: 06.02.2024**

To

Mr. A. PREM KUMAR  
Senior Manager IT,  
ICORE Software Technologies,  
Coimbatore.


Dear Sir,


**Sub: Completion of Research project- Reg.**

We are pleased to inform you that, we have successfully completed the project work on **"Smart Contracts and Their Role in Legal Automation: A Block Chain Perspective"**. Herewith we are sending the modified project source along with the design. We are glad to invite your team to visit the completion of the project in our campus. Hence the project is completed, we request you to please send the amount to **"The principal, JKK Munirajah College of Technology"**

Looking forward for your response as soon as possible.

With warm wishes

  
**Principal**  
J.K.K.Munirajah College of Technology  
(Autonomous)  
T.N.Palayam, Gobi (Tk),  
Erode (Dt) - 638 506

  
**PRINCIPAL**  
**Principal**  
J.K.K.Munirajah College of Technology  
(Autonomous)  
T.N.Palayam, Gobi (Tk),  
Erode (Dt) - 638 506.

To

06.03.2024

The principal,  
J.K.K Munirajah College of Technology,  
T.N. palayam,  
Erode - 638506.

Respected Sir,

**Sub: Final Review of Product Design – reg.**

In addition to your above reference letter, we are very happy with your research project in question. The members of the peer committee address the work's completion. With respect to the product design and development process, our team members are fully satisfied. If we require any further modification or enhancements, we will intimate you soon. Herewith I am sending the amount Rs 1, 25, 000/-.



Principal

J.K.K.Munirajah College of Technology  
(Autonomous)  
T.N.Palayam, Gobi (Tk),  
Erode (Dt) - 638 506.

**ICORE SOFTWARE TECHNOLOGIES**

No.9, Ground Floor,  
Uppilipalayam (Po),  
Coimbatore - 641 015.

Sincerely,



Mr. A.PREM KUMAR,

Senior Manager IT,

ICORE Software Technologies.



[infosolutions@icore.net.in](mailto:infosolutions@icore.net.in)

No. 9, Ground Floor, Chennimalai Layout, Andal Nagar,  
Lakshmipuram, Uppilipalayam,  
Coimbatore, Tamil Nadu 641015

**SMART CONTRACTS AND THEIR ROLE IN LEGAL AUTOMATION:**

**A BLOCK CHAIN PERSPECTIVE**

**PROJECT PROPOSAL DOCUMENTS**



**COIMBATORE – 641015**

**Done by**

**Mr.S.SUDHAKAR AP/IT**

**Mr.A.SAMPATH KUMAR AP/IT**

**DEPARTMENT OF INFORMATION TECHNOLOGY**



**2023 – 2024**

**Principal**

**J.K.K.Munirajah College of Technology  
(Autonomous)**

**T.N.Palayam, Gobi (Tk),  
Erode (Dt) - 638 506.**

## ABSTRACT

Smart contracts, powered by block chain technology, represent a transformative advancement in legal automation. These self-executing contracts enable the automatic execution of predefined actions when certain conditions are met, all without the need for intermediaries. With block chain's inherent features of decentralization, immutability, and transparency, smart contracts offer an innovative approach to streamline legal processes, enhance security, and reduce transaction costs. This paper explores the role of smart contracts in legal automation, highlighting their potential in areas such as contract management, dispute resolution, and compliance monitoring. It also examines the challenges and legal implications, including enforceability, privacy concerns, and regulatory issues, that must be addressed for the widespread adoption of smart contracts in legal frameworks. Ultimately, this paper presents a comprehensive analysis of how block chain-based smart contracts can revolutionize the legal landscape by offering more efficient, transparent, and secure solutions for legal transactions and dispute resolution.



**Principal**

J.K.K.Munirajah College of Technology  
(Autonomous)  
T.N.Palayam, Gobi (Tk),  
Erode (Dt) - 638 506.

**INVOICE**

(Original)


<b>Core Computers</b> 244, 1 <sup>st</sup> Floor, Lakshmi Complex, Nethaji road, Erode. TIN:33422884107 CST:1044986 E-mail:admin@corecom.in		Invoice no.		Dated.		
		1252		14.08.2023		
		Delivery note. -		Mode/Terms of payment: -		
Buyer <b>JKK MUNIRAJAH COLLEGE OF TECHNOLOGY,</b> TN PALAYAM (PO), GOBI (TK), ERODE DT.		Supplier's REF. -		Other Reference's: Ganesh		
		Dispatch document no.		Dated.		
		Dispatched through.		Dated.		
		Terms of Delivery.				
S.no	Description of Goods	Quantity	Rate	Per	Disc%	Amount
1	DELL LAPTOP Dell inspiron Laptop5567 i7 7 <sup>th</sup> Gen 16GB 2 TB HDD 15.6 Inch Win10+MSO 4GB Graphics Black	1NOS	38,700.00	NOS	-	38,700.00
2	ACTIVATION KEY Sage 50 premium US Edition 2021-5 User (Peachtree)Activation key I Digital Download I SGPTR2021PREM5U	1NOS	21,100.00	NOS	-	22,700.00
	5% - VAT OUT PUT A/C			5 %		61,400.00 3070.00
	<b>TOTAL</b>	2NOS				<b>₹64470.00</b>

Amount Chargeable(in words)  
**Indian Rupees Sixty Four thousand Four  
 Hundred Seventy only**



Declaration.  
 We declare that this invoice shows the actual price  
 of the goods described and that all particulars are true  
 and correct.

This is a Computer Generated Invoice

  
**Principal**  
**J.K.K.Munirajah College of Technology**  
 (Autonomous)  
 T.N.Palayam, Gobi (Tk),  
 Erode (Dt) - 638 506.



UTILIZATION CERTIFICATE

Certified that an amount of Rs. 1, 25,000/- (One Lakh Twenty Five Thousand Rupees Only) sanctioned during the year 2023-2024 in favour of JKK MUNIRAJAH COLLEGE OF TECHNOLOGY, received from the ICORE SOFTWARE TECHNOLOGIES has been utilized for the purpose of Smart Contracts and Their Role in Legal Automation: A Block Chain Perspective for it was sanctioned and condition of the grants are fulfilled / being fulfilled.

*S. Sudhany*

PROJECT INVESTIGATOR

*[Signature]*  
AUDITOR

*[Signature]*

PRINCIPAL

**Principal**

TNR & COMPANY  
Chartered Accountants  
Kooduthurai Main Road,  
Bhavani, Erode - 638 301. (TK)  
FRN No : 016669S

J.K.K. Munirajah College of Technology  
(Autonomous)  
T.N. Palayam, Gobi (Tk),  
Erode (Dt) - 638 506.

*[Signature]*

**Principal**

J.K.K. Munirajah College of Technology  
(Autonomous)  
T.N. Palayam, Gobi (Tk),  
Erode (Dt) - 638 506

Bhavani (H.O.)  
94432 60759

Erode (Br)  
90432 50307

Salem (Br)  
90037 12789

Bangalore (Br)  
97894 61632

E-mail : tnroffice@gmail.com



**DIGISCHL  
CORPORATION**  
(Robotics and Industrial Automation)

46, BEML Layout,  
Kundhalahalli Gate,  
Bangalore - 560 066,  
Karnataka, INDIA

To

11.08.2023

The principal,  
J.K.K. Munirajah College of Technology,  
T.N.palayam,  
Erode - 638506.

Respected Sir,

**Sub: Requesting R&D- Collaboration project – Design and development of IoT based smart hydroponic medicinal plantation - reg.**

DIGISCHL Corporation stands as the No.1 Software and Hardware Company in Bangalore. We Specializes in providing automation solutions for various industries including manufacturing, industrial processes and agricultural and also Provides specialized automation solutions for material handling, manufacturing, and robotics. We offer services such as PLC and SCADA programming, electrical automation systems, and robotics integration.

In collaboration with an Educational Institution, we are planning to work out the project of '**Design and development of IoT based smart hydroponic medicinal plantation**'. We like to work this project with collaboration of your Institution. As we are aware of J.K.K. Munirajah college of Technology and faculty members of Information Technology have experience in research related activities.

We are seeking for your positive and earliest reply.

Yours sincerely,

M.GOWTHAMKUMAR  
Project Manager

**DIGISCHL CORPORATION**

46, BEML LAYOUT,  
KUNDHALAHALLI GATE,  
BANGALORE - 560 066.



**PRINCIPAL**  
**JKK MUNIRAJAH COLLEGE**  
**OF TECHNOLOGY**  
T.N. PALAYAM (Po)-638 506.  
GOBI (Tk), ERODE (Dt).



**J.K.K.MUNIRAJAH**  
**COLLEGE OF TECHNOLOGY**  
(Approved by AICTE, New Delhi and Affiliated to Anna University, Chennai)  
**(AUTONOMOUS)**

ISO 9001:2015 Certified Institution

Accredited by **NAAC**  
**"A" GRADE**

☎ 02485 260754 / 55  
✉ principal@jkkmct.edu.in  
🌐 www.jkkmct.edu.in

**Smt. VASANTHAKUMARI MUNIRAJAH**  
Chairman & Managing Trustee

**Mrs. M.KASTHURIPRIYA MBA.,**  
Secretary

**DR.K.SRIDHARAN Ph.D.,**  
Principal

To

21.08.2023


Mr.M.Gowthamkumar,  
Project Manager,  
DIGISCHL Corporation,  
Bangalore - 560066.

Respected sir,

**Sub:** Research and development collaboration – Reg. Ref: DC/RD/ECE/JKKMCT/dated 11.08.2023.

Good wishes! With immense happiness, we acknowledge your letter dated 11.08.2023 and we very glad and proud to accept your company's project proposal. We are thankful to your peer members for selecting our institution for the funded project. We, the team of J.K.K. Munirajah College of technology have knowledgeable faculty members in academic, research and development areas. We assure that, we will give required technical support for the successful completion of "**Design and development of IoT based smart hydroponic medicinal plantation**". We are expecting the specifications, terms and conditions and duration of the projects to proceed further.

We would like to acknowledge that, we have received the project specifications. We have expert faculty members interested to work in the specified area as a team for the proposed project and their profiles have been enclosed. The proposed project is entitled as '**Design and development of IoT based smart hydroponic medicinal plantation**' besides, we have also enclosed the Plan of work, financial details and faculty requirements. We also request you to please depute one technical person who can handle the day to day problems of this project for discussion. We are looking forward to explore with you.

  
**Principal**  
**J.K.K.Munirajah College of Technology**  
(Autonomous)  
T.N.Palayam, Gobi (Tk),  
Erode (Dt) - 638 506

With warm wishes,

  
**PRINCIPAL**

**Principal**

**J.K.K.Munirajah College of Technology**  
(Autonomous)  
T.N.Palayam, Gobi (Tk),  
Erode (Dt) - 638 506.

Encl:

1. List of faculty members with their profile.
2. Execution plan for project work.
3. Financial details and Facilities required for completion of project.



# J.K.K.MUNIRAJAH

## COLLEGE OF TECHNOLOGY

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

**(AUTONOMOUS)**

ISO 9001:2015 Certified Institution

Accredited by **NAAC**  
**"A" GRADE**

☎ 02485 260754 / 55  
✉ principal@jkkmct.edu.in  
🌐 www.jkkmct.edu.in

**Smt. VASANTHAKUMARI MUNIRAJAH**  
Chairman & Managing Trustee

**Mrs. M.KASTHURIPRIYA MBA.,**  
Secretary


**DR.K.SRIDHARAN Ph.D.,**  
Principal

### DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING


#### FACULTY DETAILS

The following are the faculty members are involved in the project entitled 'Design and development of IoT based smart hydroponic medicinal plantation'

S.NO	NAME	DESIGNATION	AREA OF INTEREST
1.	Dr.C.MURUGESAN	HOD/ECE	Embedded System, Internet of Things
2.	Mrs.N.GOMATHI	AP/ECE	Communication, Internet of Things.

  
**Principal**  
J.K.K.Munirajah College of Technology  
(Autonomous)  
T.N.Palayam, Gobi (Tk),  
Erode (Dt) - 638 506

With warm wishes

  
**PRINCIPAL**  
**Principal**  
J.K.K.Munirajah College of Technology  
(Autonomous)  
T.N.Palayam, Gobi (Tk),  
Erode (Dt) - 638 506.



# J.K.K.MUNIRAJAH

## COLLEGE OF TECHNOLOGY

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

Accredited by **NAAC**  
"A" GRADE

☎ 02485 260754 / 55  
✉ principal@jkkmct.edu.in  
🌐 www.jkkmct.edu.in


**Smt. VASANTHAKUMARI MUNIRAJAH**  
Chairman & Managing Trustee

**Mrs. M.KASTHURIPRIYA MBA.,**  
Secretary


**DR.K.SRIDHARAN Ph.D.,**  
Principal

### EXECUTION PLAN

Sl. No	Plan	Duration
1.	Data collection and review	1 month
2.	Prototype development	2 months
3.	Prototype testing	1 month
4.	Hardware development	2 months
5.	Hardware testing	1 month
Duration required for completion of the project		7 months

  
**Principal**  
J.K.K.Munirajah College of Technology  
(Autonomous)  
T.N.Palayam, Gobi (Tk),  
Erode (Dt) - 638 506

With warm wishes

  
**PRINCIPAL**  
**Principal**  
J.K.K.Munirajah College of Technology  
(Autonomous)  
T.N.Palayam, Gobi (Tk),  
Erode (Dt) - 638 506.



**J.K.K.MUNIRAJAH**  
**COLLEGE OF TECHNOLOGY**  
(Approved by AICTE, New Delhi and Affiliated to Anna University, Chennai)  
**(AUTONOMOUS)**

ISO 9001:2015 Certified Institution

Accredited by **NAAC**  
**"A" GRADE**

☎ 02485 260754 / 55  
✉ principal@jkkmct.edu.in  
🌐 www.jkkmct.edu.in


**Smt. VASANTHAKUMARI MUNIRAJAH**  
Chairman & Managing Trustee


**Mrs. M.KASTHURIPRIYA MBA.,**  
Secretary

**DR.K.SRIDHARAN Ph.D.,**  
Principal

**FINANCIAL DETAILS**

S. No	Item Descriptions	Amount
1.	Controller Units (Arduino Uno & Raspberry Pi 4)	12,000
2.	IoT Sensors Module	11,700
3.	Actuators Module	9,600
4.	Regulated Power Supply	2,000
5.	Wireless Communication Module	8,000
6.	Transportation	11,700
7.	Miscellaneous	12,750
8.	Testing	13,250
9.	Technical Assistant	23,000
<b>Total</b>		<b>1,04,000</b>

  
**Principal**  
**J.K.K.Munirajah College of Technology**  
(Autonomous)  
T.N.Palayam, Gobi (Tk),  
Erode (Dt) - 638 506

With warm wishes  
  
**PRINCIPAL**  
**Principal**  
J.K.K.Munirajah College of Technology  
(Autonomous)  
T.N.Palayam, Gobi (Tk),  
Erode (Dt) - 638 506.



**DIGISCHL  
CORPORATION**  
(Robotics and Industrial Automation)

46, BEML Layout,  
Kundhalahalli Gate,  
Bangalore - 560 066,  
Karnataka, INDIA

To

14.09.2023

The principal,  
J.K.K. Munirajah College of Technology,  
T.N. palayam,  
Erode - 638506.

Respected Sir,

**Sub: Approval of budget and execution plan – reg.**

We are satisfied with your positive response with reference to the above letter. Our team members thoroughly satisfied with the furnished documents and details that you have sent. The project “**Design and development of IoT based smart hydroponic medicinal plantation**” has been accepted. Further, Mr.M.Gowthamkumar, Project Manager of our company will get in touch with you regarding prototype development. Expecting for the successful completion of the project.

Yours sincerely,

M.GOWTHAMKUMAR  
Project Manager

**DIGISCHL CORPORATION**  
46, BEML LAYOUT,  
KUNDHALAHALLI GATE,  
BANGALORE - 560 066.



**PRINCIPAL**  
**JKK MUNIRAJAH COLLEGE  
OF TECHNOLOGY**  
T.N. PALAYAM (Po)-638 506.  
GOBI (TK), ERODE (DI)



# J.K.K.MUNIRAJAH

## COLLEGE OF TECHNOLOGY

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

**(AUTONOMOUS)**

Accredited by **NAAC**  
**"A" GRADE**

☎ 02485 260754 / 55  
✉ principal@jkkmct.edu.in  
🌐 www.jkkmct.edu.in

**Smt. VASANTHAKUMARI MUNIRAJAH**  
Chairman & Managing Trustee

**Mrs. M.KASTHURIPRIYA MBA.,**  
Secretary

**DR.K.SRIDHARAN Ph.D.,**  
Principal

06.02.2024

To

Mr.M.Gowthamkumar,  
Project Manager,  
DIGISCHL Corporation,  
Bangalore - 560066.

Dear Sir,


**Sub: Completion of Research project - Reg.**

We are pleased to inform you that, we have successfully completed the project work on **"Design and development of IoT based smart hydroponic medicinal plantation"**. Herewith we are sending the modified project source along with the design. We are glad to invite your team to visit the completion of the project in our campus. Hence the project is completed, we request you to please send the amount to "The principal, J.K.K. Munirajah College of Technology"

Looking forward for your response as soon as possible.

  
**Principal**  
**J.K.K.Munirajah College of Technology**  
**(Autonomous)**  
**T.N.Palayam, Gobi (Tk),**  
**Erode (Dt) - 638 506**

With warm wishes

  
**PRINCIPAL**  
**Principal**  
**J.K.K.Munirajah College of Technology**  
**(Autonomous)**  
**T.N.Palayam, Gobi (Tk),**  
**Erode (Dt) - 638 506.**



**DIGISCHL  
CORPORATION**  
(Robotics and Industrial Automation)

46, BEML Layout,  
Kundhalahalli Gate,  
Bangalore - 560 066,  
Karnataka, INDIA

To

06.03.2024

The principal,  
J.K.K. Munirajah College of Technology,  
T.N.palayam,  
Erode - 638506.

Respected Sir,

**Sub:** Final Review of Product Design – reg.

In addition to your above reference letter, we are very happy with your research project in question. The members of the peer committee address the work's completion. With respect to the product design and development process, our team members are fully satisfied. If we require any further modification or enhancements, we will intimate you soon. Herewith I am sending the amount Rs 1,04,000/-.

Yours sincerely,

M.GOWTHAMKUMAR  
Project Manager

**DIGISCHL CORPORATION**

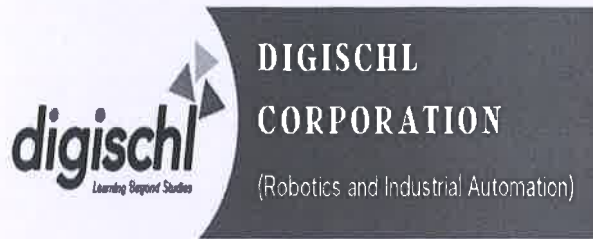
46, BEML LAYOUT,  
KUNDHALAHALLI GATE,  
BANGALORE - 560 066.



**Principal**  
J.K.K. Munirajah College of Technology  
(Autonomous)  
T.N. Palayam, Gobi (Tk),  
Erode (Dt) - 638 506.

**DESIGN AND DEVELOPMENT OF IOT BASED SMART  
HYDROPONIC MEDICINAL PLANTATION**

**PROJECT PROPOSAL DOCUMENTS**



**BANGALORE – 560066**

**Done by**

**Dr.C.MURUGESAN, HOD/ECE**

**Mrs.N.GOMATHI, AP/ECE**

**DEPARTMENT OF ELECTRONICS AND COMMUNICATION  
ENGINEERING**

A handwritten signature in blue ink, likely belonging to the Principal, is placed above the printed name and title.

**Principal**

**J.K.K.Munirajah College of Technology  
(Autonomous)  
T.N.Palayam, Gobi (Tk),  
Erode (Dt) - 638 506.**

**2023 – 2024**

## ABSTRACT

This project aimed at optimizing the growth of medicinal plants in a controlled, soil-free environment. The proposed system leverages IoT technologies to monitor and manage various environmental parameters such as humidity, temperature, pH levels, and nutrient concentration, ensuring optimal growing conditions for medical plants. Hydroponic cultivation methods are employed to grow plants without soil, utilizing a nutrient-rich water solution. The integration of IoT sensors allows real-time monitoring and data collection, which is transmitted to a central server for analysis. This ensures that necessary adjustments, such as pH correction, nutrient replenishment and temperature control are made automatically. Additionally, the system includes a mobile application that provides remote access to the plantation status, enabling users to make informed decisions on plant care. The IoT-based system is designed to improve efficiency, reduce water usage, and increase the yield of medicinal plants by providing precise control over environmental conditions. The project is particularly valuable for growing plants in areas with limited access to fertile soil, thus promoting sustainable and cost-effective medical plant cultivation. The design and development of the system also highlight the potential of smart agriculture in advancing healthcare solutions through the production of quality medicinal herbs. In conclusion, the IoT - based hydroponic medicinal plantation system offers an innovative solution for sustainable and efficient cultivation of medicinal plants, combining modern technology with agricultural practices to foster the growth of essential herbs for medical use.



**Principal**

**J.K.K.Munirajah College of Technology  
(Autonomous)  
T.N.Palayam, Gobi (Tk),  
Erode (Dt) - 638 506.**

<b>MMC ELECTRIC Pvt.Ltd</b> 2, Kothari Layout, Trichy Road Coimbatore - 641 005 <b>E-mail: <a href="mailto:admin@nithintech.co.in">admin@nithintech.co.in</a></b>	<b>BUYER</b> <b>J.K.K.MUNIRAJAH COLLEGE OF TECHNOLOGY,</b> T.N.PALAYAM (PO), GOBI (TK), ERODE DT.
---	---

**INVOICE (ORIGINAL)**

<b>Delivery To:</b> ECE Department, J.K.K.Munirajah College of Technology, T.N.Palayam(Po), Gobi (Tk), Erode Dt.	Invoice No	11
	Date	19.09.2023

Please receive the following goods in good order and condition. The attached receipt should be signed and returned to us within 7 days. Any complaints or claims will not be entertained afterwards.

S.No	Particulars	Qty	Rate	Amount
1	Controller Units (Arduino Uno & Raspberry Pi 4)	1 No	12,000	12,000
2	IoT Sensors modules	1 No	11,700	11,700
3	Actuators modules	1 No	9,600	9,600
4	Regulated Power Supply	1 No	2,000	2,000
5	Wireless Communication Module	1 No	8,000	8,000
			<b>SGST@9%</b>	3,897
			<b>IGST@ 9%</b>	3,897
			<b>Total</b>	51,094


Amount Chargeable (in words)  
**Fifty One Thousand and Ninety Four Only**



Declaration.

We declare that this invoice shows the actual price of the goods described and that all particulars are true and correct.

This is a Computer Generated Invoice

  
**Principal**  
**J.K.K.Munirajah College of Technology**  
(Autonomous)  
T.N.Palayam, Gobi (Tk),  
Erode (Dt) - 638 506.




# TNR & COMPANY


Chartered Accountants

## UTILIZATION CERTIFICATE


Certified that an amount of Rs. 1, 04,000/- (One Lakh Four Thousand Rupees Only) sanctioned during the year 2023-2024 in favour of JKK MUNIRAJAH COLLEGE OF TECHNOLOGY, received from the DIGISCHL CORPORATION BANGLORE has been utilized for the purpose of Design and Development of IOT based Smart Hydroponic Medicinal Plantation for it was sanctioned and condition of the grants are fulfilled / being fulfilled.

  
PROJECT INVESTIGATOR

  
AUDITOR

  
PRINCIPAL  
Principal

TNR & COMPANY  
Chartered Accountants  
Kooduthurai Main Road,  
Bhavani, Erode - 638 301 (TN)  
FRN No : 0166693

  
Principal  
J.K.K.Munirajah College of Technology  
(Autonomous)  
T.N.Palayam, Gobi (Tk),  
Erode (Dt) - 638 506

Bhavani (H.O.) 94432 60759	Erode (Br) 90432 50307	Salem (Br) 90037 12789	Bangalore (Br) 97894 61632
-------------------------------	---------------------------	---------------------------	-------------------------------

E-mail : tnroffice@gmail.com



**KALYANI  
BHARAT FORGE**



Phone: +91422 653 0984  
Web: [info@jsautocast.com](mailto:info@jsautocast.com)  
ADD: SF No 165/1, Sembagounden  
Pudur, Coimbatore - 641 107  
Tamil Nadu, India.

22.06.23

To  
The principal,  
J.K.K Munirajah College of Technology,  
T.N. palayam,  
Erode - 638506.

Respected Sir,

**Sub: Requesting R&D- Collaboration project –Design and development and analysis of hybrid composites made up of conventional and non conventional fibers for automobile body panels - reg.**

Founded in 2004, we are a reputed producer of rough and machined DI castings for numerous internationally renowned brands. We credit our success to our reliable and robust processes and the ability to support the customer with Castings for safety critical and high performance critical applications. Our commitment to quality and customer satisfaction has made us excel in this dynamic and demanding industry. Our forte lies in producing high quality castings with precision & accuracy. We work collaboratively with our clients to develop solutions that meet their unique requirements

In collaboration with an Educational Institution, we are planning to work out the project of 'Design and development and analysis of hybrid composites made up of conventional and non conventional fibers for automobile body panels'. We like to work this project with collaboration of your Institution. As we are aware of JKK Munirajah college of Technology and faculty members of Automobile engineering in research related activities.


We are seeking for your positive and earliest reply

Sincerely

**JS.AUTO CAST FOUNDRY  
INDIA PVT LTD  
SF.165/1, Sembagounder Pudur,  
Coimbatore-641 107,  
Tamilnadu, India.**

  
**Principal**  
**J.K.K.Munirajah College of Technology**  
**(Autonomous)**  
**T.N.Palayam, Gobi (Tk),**  
**Erode (Dt) - 638 506**

Mr.S.Vignesh  
Senior manager,  
JS Auto cast,  
Coimbatore.

 165/1 Sembagounden  
Pudur, Coimbatore - 641 107  
Tamil Nadu, India.

 +91422 653 0984

 [Info@jsautocast.com](mailto:info@jsautocast.com)



**J.K.K.MUNIRAJAH**  
**COLLEGE OF TECHNOLOGY**  
(Approved by AICTE, New Delhi and Affiliated to Anna University, Chennai)  
**(AUTONOMOUS)**

ISO 9001:2015 Certified Institution

Accredited by **NAAC**  
**"A" GRADE**

☎ 02485 260754 / 55  
✉ principal@jkkmct.edu.in  
🌐 www.jkkmct.edu.in

**Smt. VASANTHAKUMARI MUNIRAJAH**  
Chairman & Managing Trustee

**Mrs. M.KASTHURIPRIYA MBA.,**  
Secretary

**DR.K.SRIDHARAN Ph.D.,**  
Principal

**DATE: 11/07/2023**

To

Mr.S.Vignesh  
Senior manager,  
JS Auto cast,  
Coimbatore.

Respected sir,

**Sub: Research and development collaboration –Reg.  
RefDC/RD/JKKMCT/dated22.06.2023 Coimbatore.**

Good wishes! With immense happiness, we acknowledge your letter dated 22.06.2023 and we very glad and proud to accept your company's project proposal. We are thankful to your peer members for selecting our institution for the funded project. We, the team of J K K Munirajah College of technology have knowledgeable faculty members in academic, research and development areas. We assure that, we will give required technical support for the successful completion of **"Design and development and analysis of hybrid composites made up of conventional and non conventional fibers for automobile body panels"**. We are expecting the specifications, terms and conditions and duration of the projects to proceed further.

We would like to acknowledge that, we have received the project specifications. We have expert faculty members interested to work in the specified area as a team for the proposed project and their profiles have been enclosed. The proposed project is entitled as **'Design and development and analysis of hybrid composites made up of conventional and non conventional fibers for automobile body panels"** besides, we have also enclosed the Plan of work, financial details and faculty requirements. We also request you to please depute one technical person who can handle the day to day problems of this project for discussion. We are looking forward to explore with you.

**Principal**  
**J.K.K.Munirajah College of Technology**  
**(Autonomous)**  
**T.N.Palayam, Gobi (Tk),**  
**Erode (Dt) - 638 506**

With warm wishes,

**Principal**

Encl: Principal.

1. List of faculty members with their profile.
2. Execution plan for project work.
3. Financial details and Facilities required for completion of project.

**Principal**  
**J.K.K.Munirajah College of Technology**  
**(Autonomous)**  
**T.N.Palayam, Gobi (Tk),**  
**Erode (Dt) - 638 506**



**J.K.K.MUNIRAJAH**  
**COLLEGE OF TECHNOLOGY**  
(Approved by AICTE, New Delhi and Affiliated to Anna University, Chennai)  
**(AUTONOMOUS)**

ISO 9001:2015 Certified Institution

Accredited by **NAAC**  
**"A" GRADE**

☎ 02485 260754 / 55  
✉ principal@jkkmct.edu.in  
🌐 www.jkkmct.edu.in

**Smt. VASANTHAKUMARI MUNIRAJAH**  
Chairman & Managing Trustee

**Mrs. M.KASTHURIPRIYA MBA.,**  
Secretary

**DR.K.SRIDHARAN Ph.D.,**  
Principal

**DEPARTMENT OF AUTOMOBILE ENGINEERING**

**FACULTY DETAILS**

The following are the faculty members are involved in the project entitled Design and development and analysis of hybrid composites made up of conventional and non conventional fibers for automobile body panels.

S.NO	NAME	DESIGNATION	AREA OF INTREST
1	V.MAGESH	AP/AUTOMOBILE	VEHICLE BODY ENGINEERING
2	V.P.ARULMURUGAN	AP/AUTOMOBILE	COMPONENT DESIGN

With warm wishes

**Principal**  
**J.K.K.Munirajah College of Technology**  
**(Autonomous)**  
**T.N.Palayam, Gobi (Tk),**  
**Erode (Dt) - 638 506**

**Prindpal**  
**J.K.K.Munirajah College of Technology**  
**(Autonomous)**  
**T.N.Palayam, Gobi (Tk),**  
**Erode (Dt) - 638 506**



**J.K.K.MUNIRAJAH**  
**COLLEGE OF TECHNOLOGY**  
(Approved by AICTE, New Delhi and Affiliated to Anna University, Chennai)  
**(AUTONOMOUS)**

ISO 9001:2015 Certified Institution

Accredited by **NAAC**  
**"A" GRADE**

☎ 02485 260754 / 55  
✉ principal@jkkmct.edu.in  
🌐 www.jkkmct.edu.in

**Smt. VASANTHAKUMARI MUNIRAJAH**  
Chairman & Managing Trustee

**Mrs. M.KASTHURIPRIYA MBA.,**  
Secretary

**DR.K.SRIDHARAN Ph.D.,**  
Principal

**EXECUTION PLAN**

S.NO	PLAN	DURATION
1	Literature Review	4 weeks
2	Design	6 weeks
3	Fabrication	8 weeks
4	Testing and Analysis	6 weeks
5	Optimization and FEA	4 weeks
6	Environmental & Economic Analysis	4 weeks
7	Documentation & Reporting	2 weeks

With warm wishes

**Principal**  
**J.K.K.Munirajah College of Technology**  
(Autonomous)  
**T.N.Palayam, Gobi (Tk),**  
**Erode (Dt) - 638 506**

**Principal**  
**J.K.K.Munirajah College of Technology**  
(Autonomous)  
**T.N.Palayam, Gobi (Tk),**  
**Erode (Dt) - 638 506**



**J.K.K.MUNIRAJAH**  
**COLLEGE OF TECHNOLOGY**  
(Approved by AICTE, New Delhi and Affiliated to Anna University, Chennai)  
**(AUTONOMOUS)**

ISO 9001:2015 Certified Institution

Accredited by **NAAC**  
**"A" GRADE**

☎ 02485 260754 / 55  
✉ principal@jkkmct.edu.in  
🌐 www.jkkmct.edu.in

**Smt. VASANTHAKUMARI MUNIRAJAH**  
Chairman & Managing Trustee

**Mrs. M.KASTHURIPRIYA MBA.,**  
Secretary

**DR.K.SRIDHARAN Ph.D.,**  
Principal

**FINANCIAL DETAILS**

S.NO	ITEM DESCRIPTION	AMOUNT
1	Phase 1: Literature Review	5,000
2	Phase 2: Design	10,000
3	Phase 3: Fabrication	10,000
4	Phase 4: Testing and Analysis	15,000
5	Phase 5: Optimization and FEA	10,000
6	Phase 6: Environmental Analysis	8,000
7	Phase 7: Documentation	5,000
8	Equipment Procurement	25,000
9	Raw Materials	10,000
10	Contingency (10%)	10,500
11	<b>Total Estimated Cost</b>	<b>10,8500</b>

With warm wishes

**Principal**  
**J.K.K.Munirajah College of Technology**  
(Autonomous)  
T.N.Palayam, Gobi (Tk),  
Erode (Dt) - 638 506

**PRINCIPAL**  
**Principal**  
**J.K.K.Munirajah College of Technology**  
(Autonomous)  
T.N.Palayam, Gobi (Tk),  
Erode (Dt) - 638 506



**KALYANI  
BHARAT FORGE**



Phone: +91422 653 0984  
Web: [info@jsautocast.com](mailto:info@jsautocast.com)  
ADD: SF No 165/1, Sembagounden  
Pudur, Coimbatore - 641 107  
Tamil Nadu, India.

11.08.2023

To

The principal,  
J.K.K Munirajah College of Technology,  
T.N. palayam, Erode – 638506.

Respected Sir ,


Sub: Approval of budget and execution plan – reg.

We are satisfied with your positive response with reference to the above letter. Our team members thoroughly satisfied with the furnished documents and details that you have sent. The project “Design and development and analysis of hybrid composites made up of conventional and non conventional fibers for automobile body panels.” Has been accepted. Further, Mr.S.Gnanasekaran General Manager (operations) of our company will get in touch with you regarding prototype development. Expecting for the successful completion of the project

Sincerely

S.Vignesh  
Senior manager,  
JS Auto cast,  
Coimbatore.

**JS AUTO CAST FOUNDRY  
INDIA PVT LTD  
SF.165/1, Sembagounden Pudur,  
Coimbatore -641 107.  
Tamilnadu, India.**

  
**Principal  
J.K.K.Munirajah College of Technology  
(Autonomous)  
T.N.Palayam, Gobi (Tk),  
Erode (Dt) - 638 506**

📍 165/1 Sembagounden  
Pudur, Coimbatore - 641 107  
Tamil Nadu, India.

☎ +91422 653 0984

✉ [info@jsautocast.com](mailto:info@jsautocast.com)



**J.K.K.MUNIRAJAH**  
**COLLEGE OF TECHNOLOGY**  
(Approved by AICTE, New Delhi and Affiliated to Anna University, Chennai)  
**(AUTONOMOUS)**

ISO 9001:2015 Certified Institution

Accredited by **NAAC**  
**"A" GRADE**

☎ 02485 260754 / 55  
✉ principal@jkkmct.edu.in  
🌐 www.jkkmct.edu.in

**Smt. VASANTHAKUMARI MUNIRAJAH**  
Chairman & Managing Trustee

**Mrs. M.KASTHURIPRIYA MBA.,**  
Secretary

**DR.K.SRIDHARAN Ph.D.,**  
Principal

25.03.2024

To


Mr.S.Vignesh  
Senior manager,  
JS Auto cast,  
Coimbatore


Respected sir,

**Sub: Completion of Research project- Reg.**

We are pleased to inform you that, we have successfully completed the project work on "Design and development and analysis of hybrid composites made up of conventional and non conventional fibers for automobile body panels". Herewith we are sending the modified project source along with the design. We are glad to invite your team to visit the completion of the project in our campus. Hence the project is completed, we request you to please send the amount to "The principal, JKK Munirajah College of Technology"  
Looking forward for your response as soon as possible.

With warm wishes

  
**Principal**  
**J.K.K.Munirajah College of Technology**  
**(Autonomous)**  
**T.N.Palayam, Gobi (Tk),**  
**Erode (Dt) - 638 506**

  
**PRINCIPAL**  
**Principal**  
**J.K.K.Munirajah College of Technology**  
**(Autonomous)**  
**T.N.Palayam, Gobi (Tk),**  
**Erode (Dt) - 638 506**



**KALYANI  
BHARAT FORGE**

**JS AUTO CAST**

Phone: +91422 653 0984  
Web: [info@jsautocast.com](mailto:info@jsautocast.com)  
ADD: SF No 165/1, Sembagounden  
Pudur, Coimbatore - 641 107  
Tamil Nadu, India.

04.04.24

To

The principal,  
JKK Munirajah College of Technology,  
T.N. palayam, Erode.


Respected Sir,


Sub: Final Review of Product Design – reg.


In addition to your above reference letter, we are very happy with your research project in question. The members of the peer committee address the work's completion. With respect to the product design and development process, our team members are fully satisfied. If we require any further modification or enhancements, we will intimate you soon. Herewith I am sending the amount Rs 1085 00/-.

Mr.S.Vignesh  
Senior manager,  
JS Auto cast,  
Coimbatore.

**JS AUTO CAST FOUNDRY  
INDIA PVT LTD  
SF.165/1, Sembagounden Pudur,  
Coimbatore -641 107.  
Tamilnadu, India.**

  
**Principal  
J.K.K.Munirajah College of Technology  
(Autonomous)  
T.N.Palayam, Gobi (Tk),  
Erode (Dt) - 638 506**

 165/1 Sembagounden  
Pudur, Coimbatore - 641 107  
Tamil Nadu, India.

 +91422 653 0984

 [Info@jsautocast.com](mailto:info@jsautocast.com)

**DESIGN AND DEVELOPMENT AND ANALYSIS OF HYBRID COMPOSITES MADE  
UP OF CONVENTIONAL AND NON CONVENTIONAL FIBERS FOR AUTOMOBILE  
BODY PANELS**

**PROJECT PROPOSAL DOCUMENT**



**COIMBATORE-641009**

**DONE BY**

**Mr.V.Magesh AP/Auto,**

**Mr.V.P.Arulmurugan AP/Auto**

**DEPARTMENT OF AUTOMOBILE ENGINEERING**



**2023-2024**



**Principal**  
**J.K.K.Munirajah College of Technology**  
**(Autonomous)**  
**T.N.Palayam, Gobi (Tk),**  
**Erode (Dt) - 638 506**

## ABSTRACT

The growing demand for lightweight, high-performance, and sustainable materials in the automotive industry has driven the development of hybrid composites. This study focuses on the design, development, and analysis of hybrid composites made from a combination of conventional fibers (such as glass and carbon fibers) and non-conventional fibers (such as natural fibers like jute, hemp, or coir). The objective is to create a material with superior mechanical properties, reduced weight, and improved sustainability for use in automobile body panels.

The research involves selecting appropriate fiber materials, developing hybrid composite laminates, and evaluating their physical, mechanical, and thermal properties through experimental testing and numerical simulation. A systematic approach is adopted to optimize fiber orientation, fiber-matrix interface, and stacking sequence to achieve the desired performance characteristics. Advanced manufacturing techniques such as vacuum-assisted resin transfer molding (VARTM) and compression molding are employed to fabricate the hybrid composites.

Key parameters such as tensile strength, flexural strength, impact resistance, and thermal stability are analyzed and compared with traditional materials used in automobile panels. The results demonstrate the potential of hybrid composites in offering significant weight reduction without compromising structural integrity. Additionally, the incorporation of non-conventional fibers enhances the environmental friendliness of the material by reducing reliance on synthetic fibers and lowering the overall carbon footprint.

This study concludes with recommendations for the optimal hybrid composite configuration for automobile body panels and highlights future research directions, including long-term durability analysis and cost-effectiveness studies. The findings have the potential to revolutionize material selection in the automotive sector, contributing to more fuel-efficient and eco-friendly vehicles.



**Principal**  
**J.K.K. Munirajah College of Technology**  
**(Autonomous)**  
**T.N. Palayam, Gobi (Tk),**  
**Erode (Dt) - 638 506**



NO: INV-248-1  
GSTIN 27AAACH1034L1ZS

**Bill To:**

J.K.K Munirajah College of  
Technology, T.N. palayam,  
Erode - 638506.

**From:**

Hemant Tools  
+91 9786514658  
144, Ambattur chennai


Date: 21 October 2023

Description	Qty	Price	Total
Fiber Cutting Tools:	1	2500.00	4500.00
Lay-Up Tools	1	4000.00	4000.00
Resin Mixing and Dispensing Systems	1	6200.00	6200.00
Vacuum-Assisted Resin Transfer Molding	1	9000.00	9000.00
Compression Molding Press	1	12000.00	12000.00
Your Description Cutting and Finishing Tools	1	2000.00	2000.00

Sub Total 35700.00  
GST 18% 6426.00  
GRANT TOTAL 42126.00

**Payment Information:**

**Bank :** STATE BANK OF INDIA  
**No Bank :** 33016099907  
**Email :** hemanttools.com

  
**Principal**  
J.K.K.Munirajah College of Technology  
(Autonomous)  
T.N.Palayam, Gobi (Tk),  
Erode (Dt) - 638 506



**TNR & COMPANY**  
Chartered Accountants

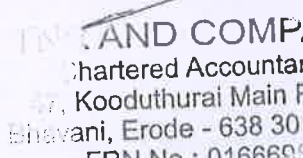
UTILIZATION CERTIFICATE

Certified that an amount of Rs. 1, 08,500/- (One Lakh Eight Thousand Five Hundred Rupees Only) sanctioned during the year 2023-2024 in favour of JKK MUNIRAJAH COLLEGE OF TECHNOLOGY, received from the BHARAT FORGE LIMITED has been utilized for the purpose of Design and Development and Analysis of Hybrid Composites made up of Conventional and Non-Conventional Fibres for Automobile body Panels for it was sanctioned and condition of the grants are fulfilled / being fulfilled.


  
PROJECT INVESTIGATOR

  
AUDITOR

  
PRINCIPAL

  
TNR & COMPANY  
Chartered Accountants  
47, Kooduthurai Main Road,  
Bhavani, Erode - 638 301. (TN)  
FRN No : 016669S

**Principal**  
J.K.K.Munirajah College of Technology  
(Autonomous)  
T.N.Palayam, Gobi (Tk),  
Erode (Dt) - 638 506.

  
**Principal**  
J.K.K.Munirajah College of Technology  
(Autonomous)  
T.N.Palayam, Gobi (Tk),  
Erode (Dt) - 638 506

Bhavani (H.O.)  
94432 60759

Erode (Br)  
90432 50307

Salem (Br)  
90037 12789

Bangalore (Br)  
97894 61632

E-mail : tnroffice@gmail.com

Office Use only

## TAMIL NADU STATE COUNCIL FOR SCIENCE AND TECHNOLOGY

Application Number: 4150  
Mechanical Engineering (EME)

### APPLICATION FOR STUDENT PROJECT PROPOSAL (2023-2024)

Project Title : REDUCE RESIDUAL STRESS AND DISTORTION OF GAS METAL ARC WELDED JOINTS BY NOVEL ROTATING ARC WELDING TECHNOLOGY

#### Student Details:

S.No	Name of the Student	Mobile No.	Email_id
1.	GOWRISANKAR M	9360268101	sankar07575@gmail.com
2.	THIRUMURUGAN M	8870481637	thirumurugan972003@gmail.com
3.	KUMARAVEL M	6382464654	kumaravelkuv466@gmail.com
4.	THIRUNAVUKKARASU S	6382825059	thiruswetha126298@gmail.com

Name of the Guide : Dr.N.SANKAR  
Designation : Assistant Professor  
Department (Full Form) : Mechanical Engineering  
Mobile Number : 8946040512  
Email : nsankarme@gmail.com  
Name of the Institution : J.K.K MUNIRAJAH COLLEGE OF TECHNOLOGY  
Institution Address with Pin code : J.K.K Munirajah college of Technology, T.N Palayam (Po), Gobi (TK), Erode-638506  
District : Erode  
Has a similar project been carried out in your Institution / elsewhere? : No  
Course Studying : UG Engineering  
Project Details : Attached

Principal

J.K.K.Munirajah College of Technology  
(Autonomous)  
T.N.Palayam, Gobi (Tk),  
Erode (Dt) - 638 506.

#### Declaration

This is to certify that Mr./Ms. GOWRISANKAR.M THIRUNAVUKKARASU / KUMARAVEL.M THIRUMURUGAN.M is a bonafide final year student of P.G. Science / U.G. Engineering / P.G. Professional Courses of our Institution and it is also certified that two copies of utilization certificate and final report along with seminar paper will be sent to the Council after completion of the project by the end of May 2024.

N. Sankar  
5/10/23  
Signature of the Guide  
[Dr. N. SANKAR  
AP/MECH  
JKKMCET]

K. S.  
5/10/23  
Signature of HoD  
[Mr. K. SRIRAM]  
HoD/MECH.

HEAD OF THE DEPARTMENT  
Department of Mechanical Engineering,  
J.K.K Munirajah College of the Technology,  
T.N.Palayam, Gobi

Signature of the Principal/Dean/Registrar  
PRINCIPAL  
JKK MUNIRAJAH COLLEGE  
OF TECHNOLOGY  
T.N. PALAYAM (Po)-638 506.  
GOBI (TK), ERODE (Dt).

# REDUCE RESIDUAL STRESS AND DISTORTION OF GAS METAL ARC WELDED Q & T STEEL JOINTS BY NOVEL ROTATING ARC WELDING TECHNOLOGY

## 1. INTRODUCTION

Welding technology has long been instrumental in fabricating structures and components in various industries, ranging from construction to aerospace. Among the numerous welding techniques, Gas Metal Arc Welding (GMAW) has gained prominence for its efficiency and versatility. However, welding processes, including GMAW, often introduce residual stresses and distortions in the welded joints, particularly when dealing with Quenched and Tempered (Q&T) steel. These unwanted side effects can compromise the structural integrity and performance of welded components, necessitating innovative solutions.

In response to this challenge, a novel welding technology known as "Rotating Arc Welding" (RAW) has emerged as a promising approach to mitigate residual stress and distortion in Q & T steel joints. This cutting-edge method involves the controlled rotation of the welding arc, offering several advantages over conventional welding techniques. By precisely manipulating the arc's movement, RAW provides enhanced heat distribution, reduced heat input, and improved control over the welding process.

In this research, we investigate into the exploration of how RAW technology can effectively reduce residual stresses and distortions in gas metal arc welded Q & T steel joints. This investigation is not only significant for improving the structural integrity of welded components but also for advancing the field of welding technology itself. The potential benefits of this innovative approach extend to various industries, including defense sector, automotive, oil and gas, and structural engineering, where Q & T steel is extensively employed. This study aims to unravel the potential of RAW technology as a game-changing solution in welding technology, ultimately contributing to safer, more reliable, and structurally sound welded joints.

## 2. OBJECTIVES

- (i) **Improved Welding Technology:** The novel rotating arc welding technology offers a significant advancement in welding techniques for Q&T (Quenched and Tempered) steel joints. By reducing residual stress and distortion, it addresses common challenges associated with gas metal arc welding (GMAW) processes, resulting in higher-quality welds.
- (ii) **Residual Stress Mitigation:** This innovative welding technology focuses on mitigating the residual stress levels typically encountered in GMAW of Q&T steel joints. By using a rotating arc approach, it minimizes the buildup of internal stresses within the welded material, which can lead to improved structural integrity and longevity of the welded joint.
- (iii) **Enhanced Weld Quality:** The application of rotating arc welding technology not only reduces residual stress and distortion but also contributes to enhanced overall weld quality. This can lead to improved weld aesthetics, better mechanical properties, and reduced post-welding treatments, ultimately resulting in cost savings and increased productivity in welding applications involving Q&T steel.



Principal

J.K.K.Munirajah College of Technology  
(Autonomous)

T.N.Palayam, Gobi (Tk),  
Erode (Dt) - 638 506.

## METHODOLOGY

### **PHASE I: Material Selection and Preparation:**

- Identify and procure Q&T steel specimens of appropriate thickness and dimensions for welding experiments.
- Conduct thorough material characterization, including tensile testing, hardness testing, and micro structural analysis, to understand the mechanical properties and behavior of the steel.
- Prepare the steel specimens by cleaning, machining, and prepping the joint edges to ensure optimal welding conditions.

### **PHASE II: Novel Rotating Arc Welding Process Implementation:**

- Develop and set up the novel rotating arc welding system, which incorporates a rotating electrode or work piece to mitigate heat concentration and control the heat input during welding.
- Determine the optimal welding parameters, including arc current, voltage, travel speed, and rotational speed, through a systematic parameter optimization process.
- Perform gas metal arc welding (GMAW) using the rotating arc technology on the Q&T steel joints while monitoring key variables such as arc stability, temperature profiles, and welding voltage.

### **PHASE III: Residual Stress and Distortion Assessment:**

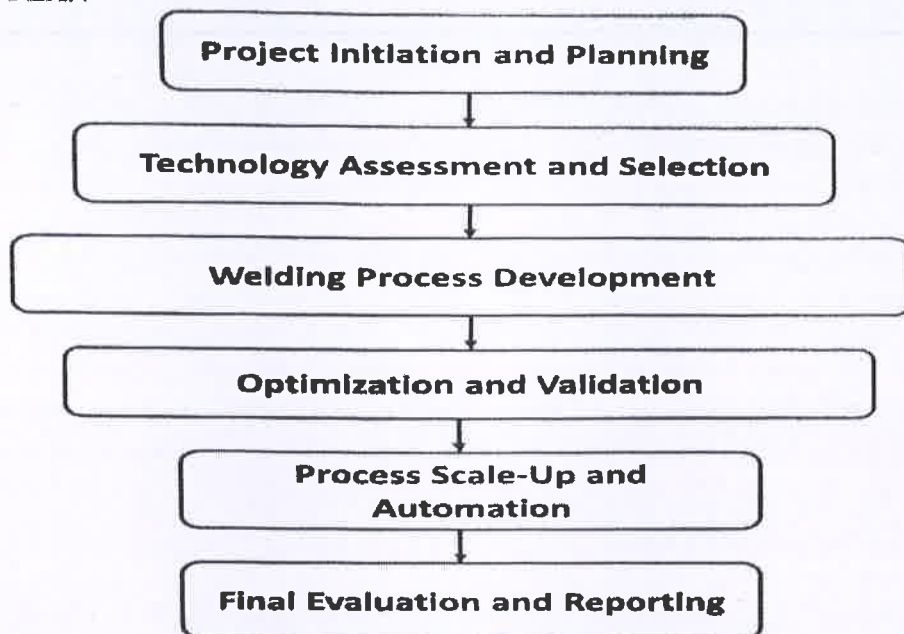
- Employ advanced measurement techniques, such as strain gauges, and non-destructive testing (NDT) methods like X-ray diffraction to quantify residual stresses and distortion in the welded joints.
- Compare the results of joints welded using the novel rotating arc welding technology with those of conventional GMAW joints to assess the effectiveness of the new method in reducing residual stress and distortion.
- Analyze the weldment microstructure and mechanical properties, including hardness distribution and tensile properties, to correlate with the observed stress and distortion reduction, providing a comprehensive understanding of the welding process.



Principal

J.K.K.Munirajah College of Technology  
(Autonomous)  
T.N.Palayam, Gobi (Tk),  
Erode (Dt) - 638 506.

#### 4. WORK PLAN



#### 5. BUDGET

S.No	Description	Amount in Rs.
1.	Purchase Quenched and tempered steel plates ( 300x300x06 mm)	2400.00
2.	Welding of steel plates (3 Nos Conventional GMAW joints and 3 Nos Rotating arc GMAW joints)	3000.00
3.	EDM cutting for sample preparation (Tensile, micro hardness, XRD and micro structure samples)	2000.00
4.	Testing of samples ( X-ray diffraction for 6 samples)	3000.00
5.	Final Report (4 copies)	1200.00
<b>Total Budget</b>		<b>11600.00</b>

#### 6. OUTCOME OF THIS PROJECT

- (i). **Enhanced Structural Integrity:** By minimizing residual stress and distortion, the structural integrity of welded joints in military equipment, such as armored vehicles, naval vessels, or aircraft, can be significantly improved.
- (ii). **Improved Performance and Reliability:** Residual stress and distortion can negatively affect the performance and reliability of defense systems. The application of novel rotating arc welding technology can help maintain precise dimensional tolerances and reduce warping or buckling in welded components.
- (iii). **Cost Savings and Maintenance Efficiency:** Reducing residual stress and distortion can lead to cost savings in terms of both initial production and long-term maintenance. Defense organizations can benefit from decreased rework and repair costs, as well as extended service life for equipment.

Principal

J.K.K.Munirajah College of Technology  
(Autonomous)  
T.N.Palayam, Gobi (Tk),  
Erode (Dt) - 638 506.

# TAMILNADU STATE COUNCIL FOR SCIENCE AND TECHNOLOGY

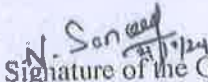
DOTE CAMPUS, CHENNAI - 600 025

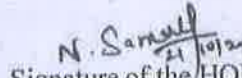
STUDENT PROJECT SCHEME 2023-2024

## UTILIZATION CERTIFICATE

1. Name of the guide and address : Dr.N.SANKAR,  
ASSISTANT PROFESSOR  
MECHANICAL ENGINEERING,  
J.K.K MUNIRAJAH COLLEGE OF TECHNOLOGY,  
T.N PALAYAM (PO), GOBI (TK), ERODE-638506
2. Name of the students : 1.GOWRISANKAR M  
2. THIRUMURUGAN M  
3. KUMARAVEL M  
4. THIRUNAVUKKARASU S
3. Title of the project : REDUCE RESIDUAL STRESS AND  
DISTORTION OF GAS METAL ARC WELDED  
JOINTS BY NOVEL ROTATING ARC  
WELDING TECHNOLOGY
4. Project code : EME -0364

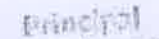
It is certified that a sum of Rs 7500 (Rupees Seven Thousand Five Hundred ) sanctioned by the council for carrying out above mentioned student project has been utilized for the purpose for which it was sanctioned and sum of Rs. zero remaining unutilized is refunded.


  
Signature of the Guide

  
Signature of the HOD

  
Signature of the

Principal with SEAL

  
Principal  
J.K.K.Munirajah College of Technology  
(Autonomous)  
T.N.Palayam, Gobi (Tk),  
Erode (Dt) - 638 506.

  
Principal  
J.K.K.Munirajah College of Technology  
(Autonomous)  
T.N.Palayam, Gobi (Tk),  
Erode (Dt) - 638 506.

# TAMILNADU STATE COUNCIL FOR SCIENCE AND TECHNOLOGY

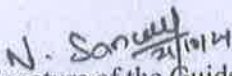
DOTE CAMPUS, CHENNAI - 600 025

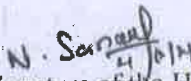
## STUDENT PROJECT SCHEME 2023-2024

### UTILIZATION CERTIFICATE

1. Name of the guide and address : Dr.N.SANKAR,  
ASSISTANT PROFESSOR  
MECHANICAL ENGINEERING,  
J.K.K MUNIRAJAH COLLEGE OF TECHNOLOGY,  
T.N PALAYAM (PO), GOBI (TK), ERODE-638506
2. Name of the students : 1.GOWRISANKAR M  
2. THIRUMURUGAN M  
3. KUMARAVEL M  
4. THIRUNAVUKKARASU S
3. Title of the project : REDUCE RESIDUAL STRESS AND  
DISTORTION OF GAS METAL ARC WELDED  
JOINTS BY NOVEL ROTATING ARC  
WELDING TECHNOLOGY
4. Project code : EME -0364

It is certified that a sum of Rs 7500 (Rupees Seven Thousand Five Hundred ) sanctioned by the council for carrying out above mentioned student project has been utilized for the purpose for which it was sanctioned and sum of Rs. zero remaining unutilized is refunded.

  
Signature of the Guide

  
Signature of the HOD

  
Signature of the

Principal with SEAL

Principal

J.K.K.Munirajah College of Technology  
(Autonomous)

T.N.Palayam, Gobi (Tk),  
Erode (Dt) - 638 506.



Principal

J.K.K.Munirajah College of Technology  
(Autonomous)

T.N.Palayam, Gobi (Tk),  
Erode (Dt) - 638 506.

# REDUCE RESIDUAL STRESS AND DISTORTION OF GAS METAL ARC WELDED JOINTS BY NOVEL ROTATING ARC WELDING TECHNOLOGY

<sup>1</sup>Sankar.N, <sup>2</sup>Gowrisankar.M, <sup>3</sup>Thirumurugan.M, <sup>4</sup>Kumaravel.M and <sup>5</sup>Thirunavukkarasu.S

<sup>1</sup>Assistant Professor and <sup>2-5</sup>UG Students  
<sup>1,2,3,4,5</sup>J.K.K.Munirajah College of Technology  
Department of Mechanical Engineering,

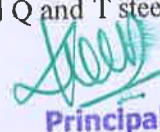
T.N.Palayam. Erode-638506, Email: sankarn@jkkmct.edu.in

## Abstract

Residual stress and distortion are common challenges in Gas Metal Arc Welding (GMAW) processes, affecting the quality and performance of welded joints. This study investigates a novel rotating arc welding technology aimed at reducing these issues in GMA welding of quenched and tempered (Q &T) steel joints. The rotating arc introduces dynamic heat distribution and mechanical action during the welding process, promoting better fusion and mitigating stress concentration zones. By controlling the rotational speed and arc stability, the technique minimizes thermal gradients that typically cause distortion and residual stresses. This work evaluates the effectiveness of rotating arc welding through experimental trials and Finite Element Analysis (FEA) method, examining parameters such as heat input, cooling rates, and residual stress and distortion. Results show an 18 % reduction in both residual stresses and distortion in rotating arc welded joint when compared to conversational arc welding process.

## Introduction

Now day's quenched and tempered (Q &T) steel plates are widely used in defence and fabrication of military vehicle applications, due to their strength and durability. Common welding methods for these steels include Shielded Metal Arc Welding (SMAW), Gas Metal Arc Welding (GMAW), Flux Core Arc Welding (FCAW), and Submerged Arc Welding (SAW). Plates under 10 mm thick typically use a single "V" butt joint, while thicker plates over 12 mm require a double "V" configuration, often involving material removal and the addition of filler metal. Conventional multi-pass welding with a stationary arc generates high heat input, leading to significant residual stresses and distortion, which negatively impact joint quality. To overcome these issues, a novel "Rotating Arc" welding technique, patented by Weld Revolution (USA), has been developed. This technology rotates the welding arc, improving sidewall fusion, reducing the number of passes, and refining the weld microstructure. Research has shown that rotating arc welding enhances joint quality and productivity, especially for high thick steel plates. Despite these advancements, limited research exists on the use of rotating arc GMAW (RA-GMAW) for thick plates, particularly in Q and T steels. This study aims to compare the effects of arc rotation on residual stress and distortion in gas metal arc welded Q and T steel joint weldments.



Principal

J.K.K.Munirajah College of Technology  
(Autonomous)

T.N.Palayam, Gobi (Tk),  
Erode (Dt) - 638 506.

## Methodology

In this work, AISI 4340 rolled steel plates (300 mm x 150 mm x 12 mm) were used as base metal (BM). AWS ER307 (1.2 mm) filler metal (FM) was used to fabricate the joints. The joints made with stationary arc welding processes are referred as SA-GMAW and the joints made with rotational arc welding processes were noted as RA-GMAW. The direction of welding was normal to the rolling direction. All necessary precautions were taken to control joint distortion. The joints were made after holding the plates in welding fixtures. For welding of steel plates, a mixture of argon (98 %) and CO<sub>2</sub> (2 %) provides inexpensive and accurate as well as clean weld without spatter for GMAW process. X-ray diffraction (XRD) was used to analyse the experimental residual stress in the weld metal region. ANSYS software used to analyse the numerical residual stress and distortion in the weld metal region.


## Results

Residual stress is measured experimentally using X-Ray Diffraction method and numerically using ANSYS software. The longitudinal stress components were measured. The slight differences between numerical and experimental residual stress were due to variations in heat input and surface inspection volume in both SA-GMAW and RA-GMAW joints. Tensile residual stress was present up to 20 mm on either side of the weldment. While comparing experimental and numerical residual stress, experimentally measured residual stress was lower than the numerical residual stress. The M shape in the longitudinal direction of residual stress is due to phase transformation in the weld metal and HAZ. The phase changes caused volumetric changes in the weld metal and interface. In the transverse direction, the molten weld metal undergoes shrinkage and phase change (austenite + delta ferrite) in the weld metal. The experimental and numerical result shows that, the higher residual stress recorded in SA-GMAW joints. The RA-GMAW joints was recorded lower residual stress when compared to SA-GMAW joints, this is due to minimum arcing time and lower heat input lead to minimize the residual stress and distortion in RA-GMAW joints.

## Conclusion

In conclusion, the residual stress and distortion measurements obtained experimentally using X-Ray Diffraction and numerically using ANSYS software. In the transverse direction, higher residual stresses were observed in SA-GMAW joints due to weld metal shrinkage and phase changes. However, RA-GMAW joints exhibited 18 % lower residual stresses due to reduced arcing time and lower heat input, making RA-GMAW a more effective process for minimizing residual stress and distortion.

**Guide: Dr.N.Sankar,** Assistant Professor, Mechanical Engineering, J.K.K. Munirajah  
College of Technology, T.N Palayam (PO), Gobi (TK), Erode-638506

  
**Principal**  
J.K.K.Munirajah College of Technology  
(Autonomous)  
T.N.Palayam, Gobi (TK),  
Erode (Dt) - 638 506.

### BANK ACCOUNT DETAILS

1	Name of the Beneficiary	THE PRINCIPAL
2	Name of the institute/College/ University/Organization	J.K.K. Munirajah college of Technology
4	PAN number	Available Trust PAN only – AAATA9998B
5	Complete address of the Beneficiary for communication	The Principal J.K.K.munirajah College of Technology T.N.Palayam post, Gobi Taluk,Erode  Tamil Nadu, India. PIN- 638506
6	Mobile/Telephone no. of the beneficiary	Phone: 04285-260754/260755/262221 Cell: 9789339900
7	Email ID of the Beneficiary	principal309@gmail.com
8	Beneficiary Bank Name	Canara Bank
9	Branch Name	Bungalowpudur
10	Address of the Bank	Sathy Athani Bhavani Main Road Bunglowpudur PIN-6385506
11	Telephone No. of the Bank	04285260234
12	Account Number (Full):	1659101014612
13	Bank Branch IFSC Code:	CNRB0001659

  
**Principal**

**J.K.K.Munirajah College of Technology**  
(Autonomous)  
T.N.Palayam, Gobi (Tk),  
Erode (Dt) - 638 506.



**TAMILNADU COUNCIL FOR SCIENCE AND TECHNOLOGY**

(Established by Government of Tamilnadu)

Directorate of Technical Education Campus, Chennai – 600 025

Ph : 044 -2230 1428 [www.tanscst.tn.gov.in](http://www.tanscst.tn.gov.in) Email: [ms.tanscst@nic.in](mailto:ms.tanscst@nic.in)

**Prof. Dr. S. Vincent**, D.Sc., Ph.D., MNASc, FNABS, FRSE(Lon)  
Member Secretary

01.10.2024

Lr.No.TNSCST/SPS 2023-2024/ 3106A /01

To

The Principal  
J.K.K Munirajah College of Technology  
TN Palayam, Erode-638 506

Sir/Madam,

Sub: TNSCST – Student Project Scheme (2023-2024) – approval intimation–grant release- Reg.

\*\*\*\*\*

With respect to the above scheme, the list of project(s) approved by the State Council is enclosed, along with the terms and conditions. Guides are requested to adhere to these terms and conditions, including the timely submission of the Utilization Certificate (UC) and the seminar paper on or before 25.10.2024.

We trust that your students have successfully completed the project. Please inform the guides to submit the Utilization Certificate and the seminar paper in accordance with the terms and conditions specified in items 5 and 6. Kindly note that the grant will be released only upon receipt of both the UC and the seminar paper. Additionally, provide the institution's bank details (Account holder name, Account Number, IFSC code, and Branch name) to facilitate the transfer of the grant via NEFT. The grant should then be promptly disbursed to the concerned students through their respective guides.

Thanking you,

Yours faithfully

Member Secretary

- Encl: a) List of the approved SPS Projects 2023-24  
b) Terms & Conditions (T&C)  
c) Format of Utilization Certificate (UC)  
d) Model Seminar Paper (SP)

Principal

J.K.K.Munirajah College of Technology  
(Autonomous)

T.N.Palayam, Gobi (Tk),  
Erode (Dt) - 638 506.



**TAMILNADU STATE COUNCIL FOR SCIENCE AND TECHNOLOGY**  
DOTE Campus, Chennai- 25

**Student Project Scheme 2023-24**

List of Approved Project(s)

S.No	Guide Name and Institutional Address	Title of the Project	Students Name	Project Code	Head of the Institution	Grant Amount
1	Dr.N.Sankar, Assistant Professor, Dept. of Mechanical Engg., J.K.K Munirajah College of Technology, TN Palayam, Erode-638 506	Reduce residual stress and distortion of gas metal arc welded joints by novel rotating arc welding technology	Gowrisankar.M, Thirumurugan.M , Kumaravel.M, Thirunavukkaras u.S	EME-0364	The Principal	Rs 7500
<b>Total</b>						<b>Rs 7500</b>

**Principal**

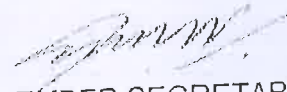
**J.K.K.Munirajah College of Technology**  
(Autonomous)  
T.N.Palayam, Gobi (Tk),  
Erode (Dt) - 638 506.


TAMILNADU STATE COUNCIL FOR SCIENCE AND TECHNOLOGY  
DOTE Campus, Chennai-600 025

STUDENT PROJECT SCHEME 2023-2024

Terms and Conditions of the grant

1. The project team **SHOULD NOT** change the topic of the project and should not deviate from the objectives of the sanctioned proposal. In the event of any such changes, sponsoring will be treated as cancelled.
2. Every sanctioned project is allotted with a Project code Number. Please refer this number while corresponding with TNSCST.
3. The project sanction letter will be sent to the Principal/Registrar/Dean of the institution with a copy to the Project guide.
4. The sanctioned completed project's, Utilization Certificate (UC) and seminar paper should be reached to 'The Member Secretary, Tamilnadu State Council for Science and Technology, DOTE Campus, Chennai-600 025' on or before 25<sup>th</sup> October 2024.
5. The Utilization Certificate should be signed by the Guide, HOD and Principal/Registrar/Dean with official **seal** as the case may be.
6. For the completed project, 2 pages seminar paper (500 words, Times New Roman, 12 font size, single column, margins left- 2.5cm, right-2cm, top-2cm & bottom- 2cm, 1.5 line space in Word format without any figures, tables & references) should be submitted/uploaded in the council website (<https://forms.gle/YYzjWfkSWEGGEcE16>) along with a scanned copy of the Utilization Certificate (PDF file) and Institutional Bank account details.
7. The institution heads informed to collect all the sanctioned project's the utilization certificate (s), seminar paper and institution bank details and send to the council address at the earliest.
8. The seminar paper will be included in the form of Proceedings which will be brought out during Seminar cum Exhibition, only for those who submit the **UC**.
9. If the guide wishes to leave the Institution where the project is based, the Institute/guide will inform the same to the Council and in consultation with Council, evolve steps to ensure successful completion of the project, before relieving the guide.
10. The Council reserves the right to order verification/audit of accounts by any Officer authorized by it. The bills and accounts shall be kept safely.
11. Students/faculties are encouraged to publish the research papers emerging out of the project work in peer reviewed Journals.
12. They should acknowledge the Council in reports and technical/scientific papers publishing based on the research work done under the project.
13. If the results of research are to be legally protected by way of patent/copy rights etc. the results should not be published in any form without action being taken to secure legal protection for the research results.
14. The state council encourages the students/faculties, who want to protect the results/invention created out of the project by getting patents through its Patent Information Centre free of cost.
15. The knowledge generated from the project will be the property of TNSCST and must be appropriately acknowledged. Any transfer of technology developed through the project will be conducted in consultation with the Council.
16. The recipient organization shall comply, with such other conditions as may be suggested in the 'guidelines' issued in this regard from time to time.

  
MEMBER SECRETARY

  
Principal  
J.K.K.Munirajah College of Technology  
(Autonomous)  
T.N.Palayam, Gobi (Tk),  
Erode (Dt) - 638 506.

Model Paper

**Antibiofilm and Antiquorum Sensing Potential of Biosynthesized Silver Nanoparticles from Nutmeg Against MDR *Salmonella enterica* Serovar Typhi**

Duraisamy S  
Division of Biological Sciences  
Tamil Nadu State Council for Science and Technology  
Chennai – 600 025

**Abstract**

Globally, *Salmonella* infection poses a major public health problem. In this study, we report the antibiofilm activity and quorum sensing inhibition of an aqueous extract of nutmeg and biosynthesized silver nanoparticles (AgNPs) against multidrug-resistant (MDR) *Salmonella enterica* serovar Typhi (*S. Typhi*) isolated from typhoid patients and asymptomatic carriers. The inhibition of biofilm formation by MDR *S. Typhi* isolates and the suppression of pigment production in *Chromobacterium violaceum* demonstrated the quorum-sensing potential of nutmeg. The aqueous nutmeg extract exhibited 87% antibiofilm activity, while the biosynthesized AgNPs showed 99.1% antibiofilm activity. Molecular docking studies further revealed that the bioactive compounds in nutmeg possess anti-quorum sensing properties.

**Introduction**

*Salmonella* species are among the most important pathogens worldwide, exhibiting high morbidity and mortality rates. Following infection, *S. Typhi* colonizes the gallbladder and can remain there long after symptoms have subsided, serving as a reservoir for the further spread of the disease. However, a significant percentage of typhoid infections result in the asymptomatic carriage of *S. Typhi*. Clinical observations among typhoid carriers show that their resistance to antibiotic treatment and the extension of infection to the gallbladder are associated with the biofilm-producing potential of *S. Typhi*. In many typhoid cases, persistence can lead to the formation of biofilms on gallstones in both acute patients and chronic carriers. Typhoidal and non-typhoidal *Salmonella* biofilms represent a major health problem in industrial, veterinary, and medical settings, as they contribute to the failure of antibiotic treatments and facilitate the development and spread of antibiotic resistance.



Principal

J.K.K.Munirajah College of Technology  
(Autonomous)

T.N.Palayam, Gobi (Tk),  
Erode (Dt) - 638 506.

1 of 2



**TNR & COMPANY**  
Chartered Accountants

**UTILIZATION CERTIFICATE**

Certified that an amount of Rs. 7,500/- (Seven Thousand Five Hundred Rupees Only) sanctioned during the year 2023-2024 in favour of JKK MUNIRAJAH COLLEGE OF TECHNOLOGY, received from the TAMILNADU STATE COUNCIL FOR SCIENCE AND TECHNOLOGY has been utilized for the purpose of Reduce Residual Stress and Distortion of Gas Metal arc Welded Joints by Novel Rotating arc Welding Technology for it was sanctioned and condition of the grants are fulfilled / being fulfilled.

*N. Saravani*  
PROJECT INVESTIGATOR

*[Signature]*  
AUDITOR

*[Signature]*  
PRINCIPAL

TNR & COMPANY  
Chartered Accountants  
Kooduthurai Main Road,  
Tirupattani, Erode - 638 301  
FRN No : 0166695

**Principal**  
J.K.K.Munirajah College of Technology  
(Autonomous)  
T.N.Palayam, Gobi (Tk),  
Erode (Dt) - 638 506.

*[Signature]*  
**Principal**  
J.K.K.Munirajah College of Technology  
(Autonomous)  
T.N.Palayam, Gobi (Tk),  
Erode (Dt) - 638 506

Bhavani (H.O.)  
94432 60759

Erode (Br)  
90432 50307

Salem (Br)  
90037 12789

Bangalore (Br)  
97894 61632

E-mail : [tnroffice@gmail.com](mailto:tnroffice@gmail.com)



## SPAARK TECHNOLOGIES

Door No.9, Gandhi Nagar, 1<sup>st</sup> Cross, Kattabomman Street,  
Ganapathy, Coimbatore-641 006.

Cell: 9842285000, 8508685000 Phone: 0422-4212226

E-mail:spaarktek@gmail.com

To

11.08.2023

The Principal,  
J.K.K.Munirajah College of Technology  
T.N.Palayam,  
Erode-638506.

Respected Sir,

**Sub: Requesting R&D Collaboration Project -E Mobility Power Train and Drive Train Test Bench -Reg.**

Spaark Technologies has a strong reputation for innovation and excellence in the field of electronic testing and measuring equipment, with a product range that includes test measuring devices and electronic testing instruments. With your expertise and our complementary resources, we envision a partnership that could lead to ground breaking advancements in E-Mobility power train and drive train test bench.

In collaboration with an educational institution we are planning to work out the project of "E Mobility Power Train and Drive Train Test Bench". We like to work this project with collaboration of your institution. As we aware of J.K.K.Munirajah College of Technology and faculty members in the department of electrical and electronics engineering have experience in research related activities.

We are seeking for your positive and earliest response.

Yours truly,

Mr.V.Angappa  
Managing Director  
Spaark Technologies.

**PRINCIPAL**  
JKK MUNIRAJAH COLLEGE  
OF TECHNOLOGY  
T.N. PALAYAM (Po)-638 506.  
GOBI (Tk), ERODE (Dt).

**SPAARK TECHNOLOGIES**  
No.9, Gandhi Nagar,  
1st Cross, Kattabomman Street,  
Coimbatore - 641 006.



**J.K.K.MUNIRAJAH**  
**COLLEGE OF TECHNOLOGY**  
(Approved by AICTE, New Delhi and Affiliated to Anna University, Chennai)  
**(AUTONOMOUS)**

ISO 9001:2015 Certified Institution

Accredited by **NAAC**  
**"A" GRADE**

☎ 02485 260754 / 55  
✉ principal@jkkmct.edu.in  
🌐 www.jkkmct.edu.in

**Smt. VASANTHAKUMARI MUNIRAJAH**  
Chairman & Managing Trustee

**Mrs. M.KASTHURIPRIYA MBA.,**  
Secretary

**DR.K.SRIDHARAN Ph.D.,**  
Principal

To

21.8.2023

V.Angappa  
Spaark Technologies  
9, Gandhi Nagar,  
1<sup>st</sup> Cross, Kattabomman Street,  
Coimbatore - 641 006.

Respected sir,

**Sub:** Research and Development Collaboration –Reg.  
**Ref:** DC/RD/EEE/JKKMCT, dated 11.08.2023.


We are writing to express our sincere joy and pride in accepting your company's project proposal, as outlined in your letter dated 11.08.2023. We are deeply grateful to your team for selecting our institution for this collaborative, funded project. At J.K.K Munirajah College of Technology, we possess a dedicated team of experienced faculty members with expertise in academics, research, and development. We assure you of our full technical support to ensure the successful completion of the –“**E-Mobility Power Train and Drive Train Test Bench**”. We eagerly anticipate receiving the detailed project specifications, terms, conditions, and timeline to proceed further.

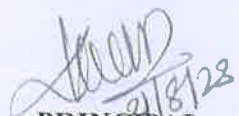
We would like to acknowledge the receipt of the project specifications. We have a team of expert faculty members with a strong interest in the specified area, and their profiles are enclosed for your review. The proposed project is entitled ‘**E-Mobility Power Train and Drive Train Test Bench**’. In addition, we have also enclosed the plan of work, financial details, and faculty requirements. We look forward to exploring this project further with you.

Included:

1. List of faculty members with their profile.
2. Execution plan for project work.
3. Financial details and Facilities require for completion of project

With warm wishes

  
**Principal**  
**J.K.K.Munirajah College of Technology**  
(Autonomous)  
T.N.Palayam, Gobi (Tk),  
Erode (Dt) - 638 506

  
**PRINCIPAL**  
**Principal**  
J.K.K.Munirajah College of Technology  
(Autonomous)  
T.N.Palayam, Gobi (Tk),  
Erode (Dt) - 638 506.



**J.K.K.MUNIRAJAH**  
**COLLEGE OF TECHNOLOGY**  
(Approved by AICTE, New Delhi and Affiliated to Anna University, Chennai)  
**(AUTONOMOUS)**

ISO 9001:2015 Certified Institution

Accredited by **NAAC**  
**"A" GRADE**

☎ 02485 260754 / 55  
✉ principal@jkkmct.edu.in  
🌐 www.jkkmct.edu.in

**Smt. VASANTHAKUMARI MUNIRAJAH**  
Chairman & Managing Trustee

**Mrs. M.KASTHURIPRIYA MBA.,**  
Secretary

**DR.K.SRIDHARAN Ph.D.,**  
Principal

**DEPARTMENT OF ELECTRICAL AND ELECTRONICS**  
**ENGINEERING**


**FACULTY DETAILS**

The following are the faculty members are involved in the project entitled 'E-Mobility Power Train and Drive Train Test Bench'

S.NO	NAME	DESIGNATION	AREA OF INTEREST
1.	Dr.C.SARAVANAN	HOD/EEE	Circuit Design, Electrical Vehicle Technology
2.	Ms.M.MOHANAMBIKA	AP/EEE	Power Electronics, MATLAB

  
**Principal**  
**J.K.K.Munirajah College of Technology**  
**(Autonomous)**  
**T.N.Palayam, Gobi (Tk),**  
**Erode (Dt) - 638 506**

With warm wishes

  
**PRINCIPAL**  
**Principal**  
**J.K.K.Munirajah College of Technology**  
**(Autonomous)**  
**T.N.Palayam, Gobi (Tk),**  
**Erode (Dt) - 638 506.**



# J.K.K.MUNIRAJAH

## COLLEGE OF TECHNOLOGY

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

**(AUTONOMOUS)**

Accredited by **NAAC**  
**"A" GRADE**

☎ 02485 260754 / 55  
✉ principal@jkkmct.edu.in  
🌐 www.jkkmct.edu.in

**Smt. VASANTHAKUMARI MUNIRAJAH**  
Chairman & Managing Trustee

**Mrs. M.KASTHURIPRIYA MBA.,**  
Secretary

**DR.K.SRIDHARAN Ph.D.,**  
Principal

### EXECUTION PLAN

Sl. No	Plan	Duration
1.	Data collection and review	1 months
2.	Prototype development	2 months
3.	Prototype testing	1 months
4.	Hardware development	2 months
5.	Hardware testing	1 months
Duration required for completion of the project		7 months

**Principal**  
J.K.K.Munirajah College of Technology  
(Autonomous)  
T.N.Palayam, Gobi (Tk),  
Erode (Dt) - 638 506

With warm wishes

**PRINCIPAL**  
Principal  
J.K.K.Munirajah College of Technology  
(Autonomous)  
T.N.Palayam, Gobi (Tk),  
Erode (Dt) - 638 506.



**J.K.K.MUNIRAJAH**  
**COLLEGE OF TECHNOLOGY**  
(Approved by AICTE, New Delhi and Affiliated to Anna University, Chennai)  
**(AUTONOMOUS)**

ISO 9001:2015 Certified Institution

Accredited by NAAC  
"A" GRADE

☎ 02485 260754 / 55  
✉ principal@jkkmct.edu.in  
🌐 www.jkkmct.edu.in

**Smt. VASANTHAKUMARI MUNIRAJAH**  
Chairman & Managing Trustee

**Mrs. M.KASTHURIPRIYA MBA.,**  
Secretary

**DR.K.SRIDHARAN Ph.D.,**  
Principal

**FINANCIAL DETAILS**

S.No	Item Descriptions	Amount
1.	PMDC Motor	14,000
2.	PMDC Motor Controller	18,000
3.	Measuring Instruments	7000
4.	Hardware	60,000
5.	Transportation	10250
6.	Miscellaneous	9,250
7.	Testing	12,000
8.	Technical Assistant	22,000
	<b>Total</b>	<b>1,52,500</b>

With warm wishes

**Principal**  
**J.K.K.Munirajah College of Technology**  
(Autonomous)  
T.N.Palayam, Gobi (Tk),  
Erode (Dt) - 638 506

**PRINCIPAL**  
**Principal**  
J.K.K.Munirajah College of Technology  
(Autonomous)  
T.N.Palayam, Gobi (Tk),  
Erode (Dt) - 638 506.



## SPAARK TECHNOLOGIES

Door No.9, Gandhi Nagar, 1<sup>st</sup>Cross, Kattabomman Street,  
Ganapathy, Coimbatore-641 006.

Cell: 9842285000, 8508685000 Phone: 0422-4212226

E-mail: spaarktek@gmail.com

To

25.08.2023

The Principal,  
J.K.K.Munirajah College of Technology,  
T.N. Palayam,  
Erode -638506.

Respected Sir,

**Sub:** Approval of budget and execution plan-Reg.

We are satisfied with your positive response with reference to the above letter. Our team members thoroughly satisfied with the furnished documents and details that you have sent. The project "E-Mobility Power Train and Drive Train Test Bench" has been accepted. Further, Mr.V.Angappa, technical analyzer of our company will get in touch with you regarding prototype development. Expecting for the successful completion of the project.

Principal

J.K.K.Munirajah College of Technology  
(Autonomous)  
T.N.Palayam, Gobi (Tk),  
Erode (Dt) - 638 506.

**SPAARK TECHNOLOGIES**

No.9, Gandhi Nagar,  
1st Cross, Kattabomman Street,  
Coimbatore - 641 006.

Sincerely,

Mr. V.Angappa  
Managing Director  
Spaark Technologies.



**J.K.K.MUNIRAJAH**  
**COLLEGE OF TECHNOLOGY**  
(Approved by AICTE, New Delhi and Affiliated to Anna University, Chennai)  
**(AUTONOMOUS)**

ISO 9001:2015 Certified Institution

Accredited by **NAAC**  
**"A" GRADE**

☎ 02485 260754 / 55  
✉ principal@jkkmct.edu.in  
🌐 www.jkkmct.edu.in

**Smt. VASANTHAKUMARI MUNIRAJAH**  
Chairman & Managing Trustee

**Mrs. M.KASTHURIPRIYA MBA.,**  
Secretary

**DR.K.SRIDHARAN Ph.D.,**  
Principal

To

27.03.2024

Mr.V.Angappa  
Spaark Technologies  
9, Gandhi Nagar,  
1<sup>st</sup>Cross, Kattabomman Street,  
Coimbatore - 641 006.

Dear Sir,

**Sub:** Completion of Research project-Reg.

We are pleased to inform you that, we have successfully completed the project work on "E-Mobility Power Train and Drive Train Test Bench". Here with we are sending the modified project source along with the design. We are glad to invite your team to visit the completion of the project in our campus. Hence the project is completed, we request you to please send the amount to "The principal, J.K.K Munirajah College of Technology"

Looking forward for your response as soon as possible.

**Principal**

**J.K.K.Munirajah College of Technolog**  
**(Autonomous)**  
**T.N.Palayam, Gobi (Tk),**  
**Erode (Dt) - 638 506**

With warm wishes

**PRINCIPAL**

**Principal**

**J.K.K.Munirajah College of Technology**  
**(Autonomous)**  
**T.N.Palayam, Gobi (Tk),**  
**Erode (Dt) - 638 506.**



**SPAARK  
TECHNOLOGIES**

**SPAARK TECHNOLOGIES**

Door No.9, Gandhi Nagar, 1<sup>st</sup>Cross, Kattabomman Street,  
Ganapathy, Coimbatore-641 006.

Cell: 9842285000, 8508685000 Phone: 0422-4212226

E-mail: spaarktek@gmail.com

To

20.04.2024

The Principal,  
J.K.K.Munirajah College of Technology,  
T.N. Palayam,  
Erode-638506.

Respected Sir,

**Sub: Final Review of Product Design- Reg.**

In addition to your above reference letter, we are very happy with your research project in question. The members of the peer committee address the work's completion. With respect to the product design and development process, our team members are fully satisfied. If we require any further modification or enhancements, we will intimate you soon. Herewith I am sending the amount Rs.1, 52,500/-.

**Principal**

J.K.K.Munirajah College of Technology  
(Autonomous)  
T.N.Palayam, Gobi (Tk),  
Erode (Dt) - 638 506.

**SPAARK TECHNOLOGIES**  
No.9, Gandhi Nagar,  
1st Cross, Kattabomman Street,  
Coimbatore - 641 006.

Sincerely,

Mr. V. Angappa  
Managing Director  
Spaark Technologies

# **E-MOBILITY POWER TRAIN AND DRIVE TRAIN**

## **TEST BENCH**

### **PROJECT PROPOSAL DOCUMENTS**



**SPAARK  
TECHNOLOGIES**

COIMBATORE

**Done by**

**Dr.C.SARAVANAN HOD/EEE**

**Ms.M.MOHANAMBIKA AP/EEE**

**DEPARTMENT OF ELECTRICAL AND ELECTRONICS  
ENGINEERING**



**2023–2024**



**Principal**

**J.K.K.Munirajah College of Technology  
(Autonomous)**

**T.N.Palayam, Gobi (TK),  
Erode (Dt) - 638 506.**

## ABSTRACT

This project focuses on the development of a specialized test bench for analyzing and optimizing chain drive systems used in electric mobility powertrains and drivetrains. Chain drives play a critical role in transmitting mechanical power efficiently between components, making their performance crucial for the overall efficiency and reliability of electric vehicles. The proposed test bench is designed to evaluate key parameters such as torque, speed, power transmission efficiency, vibration, and wear under varying load and operational conditions.

The system integrates advanced data acquisition technologies, real-time monitoring, and dynamic load simulation to replicate real-world scenarios. Additionally, it features modular adaptability for testing different chain designs, materials, and configurations. By providing accurate insights into chain performance and durability, this test bench aims to support manufacturers and researchers in optimizing chain drive systems for enhanced performance and longevity. This contributes to advancing e-mobility solutions by ensuring high-quality, efficient, and sustainable drivetrain systems for electric vehicles.



**Principal**

**J.K.K.Munirajah College of Technology  
(Autonomous)  
T.N.Palayam, Gobi (Tk),  
Erode (Dt) - 638 506.**

<b>MMC ELECTRIC PVT.LTD</b> 2, Kothari Layout, Trichy Road, Coimbatore- 641 005. E-mail: <a href="mailto:admin@nithintech.co.in">admin@nithintech.co.in</a>	<b>BUYER</b> <b>J.K.K.MUNIRAJAH COLLEGE OF TECHNOLOGY,</b> T.N.PALAYAM(PO), GOBI (TK), ERODE (DT)-638506.
---	---

**INVOICE (ORIGINAL)**

<b>Delivery To:</b> EEE Department, J.K.K.Munirajah College of Technology, T.N.Palayam (Po), Gobi (Tk), Erode (Dt).	Invoice No	15
	Date	15.09.2023

Please receive the following goods in good order and condition. The attached receipt should be signed and returned to us within 7 days. Any complaints or claims will not be entertained afterwards.

S.No	Particulars	Qty	Rate	Amount
1	PMDC Motor	1 No	14,000	14,000
2	PMDC Motor Controller	1 No	18,000	18,000
3	Measuring Instruments	1 No	7000	7000
				<b>39,000.00</b>
			<b>SGST@ 9%</b>	<b>3510.00</b>
			<b>IGST@ 9%</b>	<b>3510.00</b>
			<b>Total</b>	<b>46,020.00</b>

Amount Chargeable (in words)  
**Forty-Six Thousand Twenty Rupees Only**



Declaration.

We declare that this invoice shows the actual price of the goods described and that all particulars are true and correct.

This is a Computer Generated Invoice

  
**Principal**  
**J.K.K.Munirajah College of Technology**  
(Autonomous)  
T.N.Palayam, Gobi (Tk),  
Erode (Dt) - 638 506.



ಶಿವಮೊಗ್ಗ ಕೋಟೆ  
CITY UNION BANK LTD.

SIVANANDA COLONY BRANCH  
NO.69,RAJU NAIDU ROAD  
COMBATORRE 641012 - 641012  
IFS Code : CIUB0000486

VALID FOR THREE MONTHS ONLY

23 04 2024  
D D M M Y Y

Pay The Principal, J.K.K. Munirajah College 2 Technology OR BEARER  
या धारक को

Rupees रुपये One lakh fifty-two thousand and  
five hundred only अदा करें ₹ 1,52,500/-

A/c. No. CA 510909010034928

V. Ramesh

For SPAARK TECHNOLOGIES

Payable at all branches

Partner  
Please sign above

⑈000168⑈ 641054028⑈ 100027⑈ 29

Principal  
J.K.K.Munirajah College of Technology  
(Autonomous)  
T.N.Palayam, Gobi (TK),  
Erode (Dt) - 638 506.



# TNR & COMPANY

Chartered Accountants

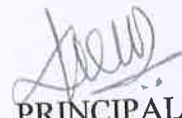
## UTILIZATION CERTIFICATE


Certified that an amount of Rs. 1, 52,500/- (One Lakh Fifty Two Thousand Five Hundred Rupees Only) sanctioned during the year 2023-2024 in favour of JKK MUNIRAJAH COLLEGE OF TECHNOLOGY, received from the SPARK TECHNOLOGIES PRIVATE LIMITED has been utilized for the purpose of E-Mobility Power Train and Drive Train Test Bench for it was sanctioned and condition of the grants are fulfilled / being fulfilled.

  
PROJECT INVESTIGATOR

  
AUDITOR

TNR & COMPANY  
Chartered Accountants  
Kooduthurai Main Road  
Bhavani, Erode - 638 301. (TN)  
FRN No : 0166698

  
PRINCIPAL  
Principal  
J.K.K.Munirajah College of Technology  
(Autonomous)  
T.N.Palayam, Gobi (Tk),  
Erode (Dt) - 638 506.

  
Principal  
J.K.K.Munirajah College of Technology  
(Autonomous)  
T.N.Palayam, Gobi (Tk),  
Erode (Dt) - 638 506

Bhavani (H.O.) 94432 60759	Erode (Br) 90432 50307	Salem (Br) 90037 12789	Bangalore (Br) 97894 61632
-------------------------------	---------------------------	---------------------------	-------------------------------

E-mail : tnroffice@gmail.com