K.S.R. COLLEGE OF ENGINEERING

An Autonomous Institution

(Approved by AICTE, Affiliated to Anna University, Accredited by NAAC A++)

K.S.R. Kalvi Nagar, Tiruchengode - 637 215, Namakkal District, Tamil Nadu

DEPARTMENT OF SAFETY AND FIRE ENGINEERING

APEX SAFETY 2024

TECHNICAL MAGAZINE

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K.S.R. COLLEGE OF ENGINEERING

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Chairman Message

Thiru. R. Srinivasan, BBM., MISTE.,

Chairman, KSR Educational Institutions

As we stand on the brink of new beginnings and boundless possibilities, I am filled with an immense sense of pride and optimism about what we can achieve together at KSR Educational Institutions. Our founder, Dr. K S Rangasamy, laid a strong foundation rooted in the belief that education is the most powerful tool to transform lives. Carrying forward his legacy, we remain committed to not just educating but empowering young minds to make a meaningful impact in the world.

In today's fast-paced, technology-driven society, the challenges are as dynamic as the opportunities are great. It is imperative for education to transcend traditional learning and encompass the development of holistic, innovative, and critical thinking skills. At KSR, we strive to equip you, our students, with the capabilities to not only adapt to changes but to drive them. We are dedicated to nurturing a generation of leaders, innovators, and thinkers who are ready to take on global challenges with local sensibilities.

Making an Impact is not just a phrase—it's our mission. It's about inspiring each one of you to pursue your passions with determination and a sense of responsibility towards the betterment of society. We encourage you to dream big, push boundaries, and question the status quo. Our campus is a melting pot of ideas where your creativity and ambitions are nurtured, allowing you to flourish in ways you never imagined.

With best wishes,

Thiru. R. Srinivasan,

Chairman, KSR Educational Institutions.

K.S.R. COLLEGE OF ENGINEERING

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Vice Chairman's Message

Mr. K. S. Sachin, Vice Chairman,

KSR Educational Institutions

At KSREI, we stand at the intersection of tradition and transformation, committed to shaping a future driven by knowledge, innovation, and values. While our roots are firmly grounded in a legacy of academic excellence, our vision extends beyond boundaries, preparing students to excel in an ever-evolving global landscape.

Our goal is to create a dynamic learning ecosystem that fosters critical thinking, technological prowess, and ethical leadership. We envision KSREI as a hub of intellectual growth, where students are empowered with 21st-century skills while embracing the timeless virtues of integrity, perseverance, and service.

Looking ahead, we aim to integrate cutting-edge advancements in education, strengthen industry collaborations, and expand global opportunities for our students. With a deep commitment to holistic development, we continue to nurture future leaders who will shape society with wisdom and purpose. Together, we build the future—rooted in values, driven by vision.

With best wishes,
Mr. K. S. Sachin,
Vice Chairman,
KSR Educational Institutions.

K.S.R. COLLEGE OF ENGINEERING

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Principal Message

Dr. M. Venkatesan, Principal, KSRCE

Education is the manifestation of love and my most cherished possession. It dispels ignorance and, through enlightenment, guides individuals toward righteous thought and action. Education empowers women and men alike, broadens the horizons of the mind, energizes society, and enables individuals to live with dignity and purpose. We firmly believe that education is a powerful medium for social transformation, and we are committed to making continuous efforts toward the advancement of the academic landscape in India. We draw inspiration from the bright and successful careers of our thousands of students whose achievements bring pride to our institution and contribute meaningfully to society.

With best wishes,
Dr. M. Venkatesan
Principal, KSR College of Engineering.

K.S.R. COLLEGE OF ENGINEERING

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Head of the Department Message

Dr. M.Prabu, Professor and Head

Department of Safety and fire Engineering

Welcome to the Department of Safety and Fire Engineering! As HOD, I'm proud to lead a department dedicated to a paramount field. Our mission is to cultivate experts who champion safety and mitigate risks across all sectors. We offer a robust curriculum, covering fire dynamics, industrial safety, risk management, and emergency preparedness. Our programs are designed to equip you with both theoretical knowledge and crucial practical skills.

We emphasize hands-on learning, ensuring you're ready for real-world challenges. Our dedicated faculties, with vast industry experience, are committed to your success. You'll gain the expertise to safeguard lives, protect property, and ensure operational continuity. The global demand for skilled safety and fire engineers is continuously expanding, opening diverse and impactful career paths. Join us in making a tangible difference in the world. We actively pursue cutting-edge research to advance safety science. Your time here will empower you to become a responsible, proactive safety professional. Let's collaborate to build a safer, more resilient future for everyone.

With best wishes,
Dr. M.Prabu
Professor and Head
Department of Safety and fire Engineering
K.S.R. College of Engineering
Tiruchengode – 637215.

K.S.R. COLLEGE OF ENGINEERING

DEPARTMENT OF SAFETY & FIRE ENGINEERING

The Department of Safety and Fire Engineering was established in the year 2020 with an intake of 60 students. The Department of Safety and Fire Engineering was formed with the primary objective of providing world class education in the field of Safety and Fire Engineering, while addressing the problems of today and tomorrow. Right from its inception, the department has been offering excellent infrastructural facilities with various sectors like oil and gas, aerospace, chemical, assembly & manufacturing and construction of safety platforms for aspiring professional students to meet the growing demands of the safety-related concerns in the various industries by proper application of engineering methods for a safe work environment.

The department imparts world class training, research and provides state of the safety equipment's facilities to the students. The department offers the students with constant motivation and support to bring out their talents in curricular, co-curricular, and extra-curricular perspectives, thus, uplifting them into dynamic professionals. Our faculty and staff are our biggest strength, with industrial experience and exposure, specialized in engineering disciplines such as Chemical Engineering, Civil Engineering, Electrical Engineering, Mechanical Engineering and Safety, and Fire Engineering.

Vision of the Institution

We envision to achieve status as an Excellent Educational Institution in the global knowledge hub, making self- learners, experts, ethical and responsible engineers, technologists, scientists, managers, administrators and entrepreneurs who will significantly contribute to research and environment friendly sustainable growth of the nation and the world.

Mission of the Institution

- To inculcate in the students self-learning abilities that enable them to become competitive and considerate engineers, technologists, scientists, managers, administrators and entrepreneurs by diligently imparting the best of education, nurturing environmental and social needs.
- To foster and maintain mutually beneficial partnership with global industries and Institutions through knowledge sharing, collaborative research and innovation.

Vision of the Department

- To emerge as a centre of excellence in Safety and Fire Engineering using the framework of quality education through advanced industry, research, entrepreneurship and society.

Mission of the Department

- To provide quality education and to prepare nationally and internationally competitive students for a successful career in safety, occupational health, environmental management and fire protection engineering.
- To inculcate the need for sustainable development in research and innovations.

Program Educational Objectives (PEOs)

- Have a sound knowledge in Safety and Fire Engineering aspects to provide solutions for Potential hazards.
- Expertise in the area of Thermal, Chemical Reactions, Structural Stability and Environmental Impacts.
- Practice their Profession through evaluation, communication, ethics and social responsibility.

Program Outcomes (POs)	
PO1	**Engineering Knowledge:** Apply knowledge of mathematics, natural science, computing, engineering fundamentals and an engineering specialization as specified in WK1 to WK4 respectively to develop to the solution of complex engineering problems.
PO2	**Problem Analysis:** Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development. (WK1to WK4)
PO3	**Design/Development of Solutions:** Design creative solutions for complex engineering problems and design/develop systems/components/processes to meet identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society and environment as required. (WK5)
PO4	**Conduct Investigations of Complex Problems:** Conduct investigations of complex engineering problems using research-based knowledge including design of experiments, modelling, analysis & interpretation of data to provide valid conclusions. (WK8).
PO5	**Engineering Tool Usage:** Create, select and apply appropriate techniques, resources and modern engineering & IT tools, including prediction and modelling recognizing their limitations to solve complex engineering problems. (WK2 and WK6).
PO6	**The Engineer and The World:** Analyze and evaluate societal and environmental aspects while solving complex engineering problems for its impact on sustainability with reference to economy, health, safety, legal framework, culture and environment. (WK1, WK5, and WK7).
PO7	**Ethics:** Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & international laws. (WK9)
PO8	**Individual and Collaborative Team work**: Function effectively as an individual, and as a member or leader in diverse/multi-disciplinary teams.
PO9	**Communication:** Communicate effectively and inclusively within the engineering community and society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations considering cultural, language, and learning differences.
PO10	**Project Management and Finance:** Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments.
PO11	**Life-Long Learning:** Recognize the need for, and have the preparation and ability for i) independent and life-long learning ii) adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological change. (WK8)
Program Specific Outcomes (PSOs)	
PSO1	Design a safety and fire system for industries, building and other area thereby saving the loss due to a fire and accidents.
PSO2	Analyze hazards in a work place and to rectify it by suitable safety and fire engineering solutions.

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APEX SAFETY 2024

CHIEF PATRON

Thiru. R.Srinivasan

Chairman, KSR Educational Institution

PATRONS

Dr. M. Venkatesan

Principal

K.S.R. College of Engineering

ADVISOR

Dr.M.Prabu

Professor & Head, SFE, K.S.R. College of Engineering

EDITOR

Mr.R.Ashok Kumar

Assistant Professor

Intelligent Confined Space Health and Safety System

This Study aims to evaluate the performance of a Smart Confined Space Monitoring Rescue System Storage tanks, pipelines, and tunnels are examples of confined spaces that present serious safety risks because of their limited accessibility, hazardous gas concentrations, and restricted ventilation. This research investigates the development of a smart confined space monitoring and rescue system utilizing IoT and multi-sensor technology for enhanced safety in hazardous environments. The experiment was conducted in a controlled lab setup at KSRCE, using real-time data from confined spaces such as pipelines and underground tanks. The system integrates gas sensors for detecting harmful gases, temperature and humidity sensors for environmental monitoring, and IoT modules for wireless data transmission. Two groups were tested: Group 1 used a conventional gas detection system with 50 readings, and Group 2 tested the proposed IoT-based system with multi-sensor fusion, also with 50 readings. Key parameters, including gas concentration, temperature, humidity, and response time, were measured. The results indicated that the proposed system achieved a 30% reduction in response time, a 25% improvement in gas detection accuracy, and a 40% increase in communication range compared to conventional methods. Statistical analysis using SPSS revealed a significant improvement in the system's performance, validating its effectiveness in improving safety and rescue operations in confined spaces.

Hariharan. M, IV YEAR SFE,
K.S.R College of Engineering

Dynamic and Advanced Beam Anchor in Industrial and Construction Application

This study aims to evaluate the performance of an innovative beam anchor system compared to existing methods in improving worker safety, ease of use, and load-bearing capacity in height-related industries. Materials and Methods: The experiment was conducted in the Occupational Health and First Aid Lab using load-testing equipment. Two groups were tested: Group 1 is the aluminum beam anchor and Group 2 is the dynamic and advanced beam anchor, with 10 samples each. Key parameters analyzed included installation time, load capacity, and failure modes. Statistical analysis was performed using SPSS to compare performance variations. The proposed beam anchor system significantly outperformed the existing method, with an average load capacity of 27.8 kN compared to 15.2 kN in the existing system. Installation time was reduced from 5.3 minutes to 3.1 minutes. Unlike the existing system, which showed slippage and deformation, the proposed system demonstrated secure attachment with no failure during testing.

Ragul Prakash. D, IV YEAR SFE,
K.S.R College of Engineering

ADVANCED TEMPERATURE MONITORING AND SAFETY TECHNOLOGIES IN EV BATTERY SYSTEM

The battery thermal management in electric vehicles (EVs) by integrating advanced monitoring and cooling techniques to improve safety, efficiency, and real-time data transmission. Group 1 Existing Method is traditional cooling mechanisms using MQ-2, MQ-3, and MQ-7 sensors on ESP32, and Group 2

Proposed Method is advanced thermal management system using the same sensors on ESP32-CAM. Experiments were conducted in a controlled environment. Key performance parameters, including detection accuracy, battery life, and transmission efficiency, were analyzed using statistical tests like standard deviation and variance to assess stability. The proposed method enhanced detection accuracy from 85% to 92%, extended battery life from 90 to 120 minutes, and improved transmission efficienc from 1.5 Mbps to 2.3 Mbps. Lower standard deviation values in Group 2 compared to Group 1 indicate greater stability. The findings confirm the effectiveness of the improved system in ensuring battery safety, optimizing performance, and enhancing real-time monitoring, making it a viable solution for future EV applications.

Uvanesh P S, IV YEAR SFE,
K.S.R College of Engineering

ENHANCED SAFETY ASSURED WEARABLE TECHNOLOGY FOR PERSONALIZED SAFETY DEVICE

In construction sites are among the most hazardous workplaces, exposing workers to various physical risks and environmental hazards. This system uses a combination of sensors, including the BMP280 MAX30100 a GPS module for real-time location tracking, an OLED display for on-site feedback, and a panic button for emergency alerts. The microcontroller unit (MCU) serves as the system's processing hub, collecting datafrom the sensors, analyzing it for real-time risk detection, and transmitting information to a remote server for continuous monitoring. In addition, the OLED display provides the worker with real-time health and environmental data, while the GPS module allows for tracking the worker's location, ensuring swift response in case of emergencies. The system also features a panic button that enables the worker to send an

immediate distress signal, along with GPS coordinates, to supervisors in urgent situations. This project aims to create a reliable, energy-efficient, and easy-to-use monitoring solution that not only safeguards the health and safety of construction workers but also empowers supervisors with data to respond proactively. The proposed IoT-based system could significantly reduce risks in construction environments, potentially preventing accidents and health-related issues by offering timely interventions and enhanced situational awareness.

V SUNDAR, IV YEAR SFE,
K.S.R College of Engineering

DESIGN OF SAFETY FIXTURE FOR SECURELY HOLDING ABC FIRE EXTINGUSHER DURING THE HYDRAULIC TEST

The design and development of a safety fixture for securely holding an ABC fire extinguisher during hydraulic testing is a vital engineering solution to ensure both the safety of the testing process and the integrity of the fire extinguisher. Hydraulic testing is performed on fire extinguishers to assess their ability to with stand high-pressure environments, ensuring they will perform effectively in real-world fire emergencies. However, the process poses significant risks if the extinguisher is not properly secured, as shifting or damage could lead to inaccurate test results, equipment failure, or potential injury. This project focuses on the design of a custom safety fixture that will securely hold an ABC fire extinguisher in place during the hydraulic testing procedure. The fixture's primary objectives are to provide stable and uniform support, reduce the risk of movement or shifting under high pressure, and prevent damage to both the extinguisher and surrounding equipment. The design considerations include the

selection of high-strength materials such as steel or reinforced composites to with stand the forces exerted during testing. The fixture will be equipped with adjustable clamps or brackets to accommodate different sizes and models of ABC fire extinguishers while maintaining a secure and uniform hold. Additionally, features such as vibration dampening, shock resistance, and anti-slip mechanisms will be integrated to further enhance safety and stability.

KANNAN A, IV YEAR SFE,
K.S.R College of Engineering

ADVANCEMENTS IN ROBOTICS CAPABLE OF AUTONOMOUSLY NAVIGATING FIRES AN ENSURING THE SAFETY OF HUMANS

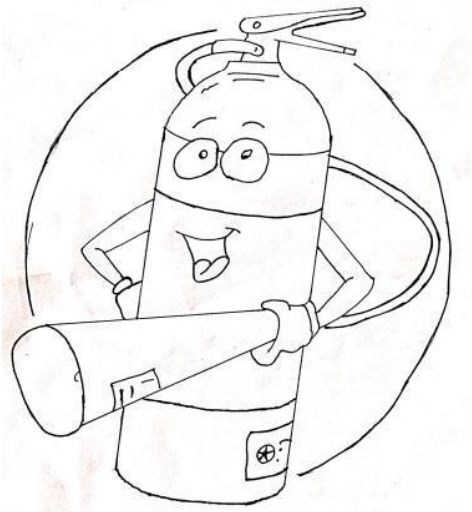
This study aimed to develop and evaluate an Autonomous Fire Protection Robot for efficient fire detection and extinguishing. The experiment involved two groups: Group 1 is Manual Fire Extinguishing and Group 2 is Autonomous Fire Protection Robot. Two groups were tested with 10 samples each, under different fire scenarios, analyzing parameters such as response time, fire type, and detection angle to compare performance. The robot achieved a mean response time of 2.5 seconds, significantly faster than the 4.8 seconds of manual methods, with a standard deviation of 0.4 seconds, ensuring reliable performance. The robot effectively detected and extinguished fires, proving to be a promising fire safety solution. Minor sensor limitations can be improved with advanced sensors and AI integration in future developments.

LOGESHWARI N, IV YEAR SFE,
K.S.R College of Engineering

AN INVESTIGATION TO ENHANCE THE LATHE OPERATION BY THE IMPLEMENTATION OF IoT SENSORS

Lathe machines are constantly monitored and supervised to provide the highest levels of production, efficiency, and safety. This study investigates the design and implementation of an IoT-based lathe monitoring system that uses sophisticated machine learning algorithms and real-time sensor data to optimize operations. The suggested system's utilization of many sensors, including alcohol, vibration, temperature, proximity, UV, infrared (IR), and alcohol sensors, in combination with a cloud-based platform enables predictive maintenance, real-time monitoring, automated quality control, and improved safety measures. The Internet of Things (IoT) solution enhances production efficiency while simultaneously reducing operator hazards and minimizing both unscheduled downtime and product rejections. By utilizing machine learning techniques the system detects forthcoming errors so it can prevent operational incidents. The experimental data demonstrates that the strategy results in substantial advancements regarding operator protection together with enhanced tool operations and improved manufacturing outputs. The framework provides scalability and adaptability to modern industrial automation systems and smart production approaches which strengthen industrial competitiveness.

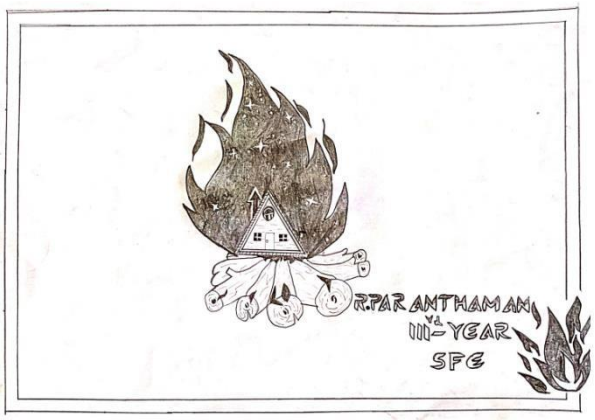
S.LAXMANA ESWARAN, IV YEAR SFE,
K.S.R College of Engineering



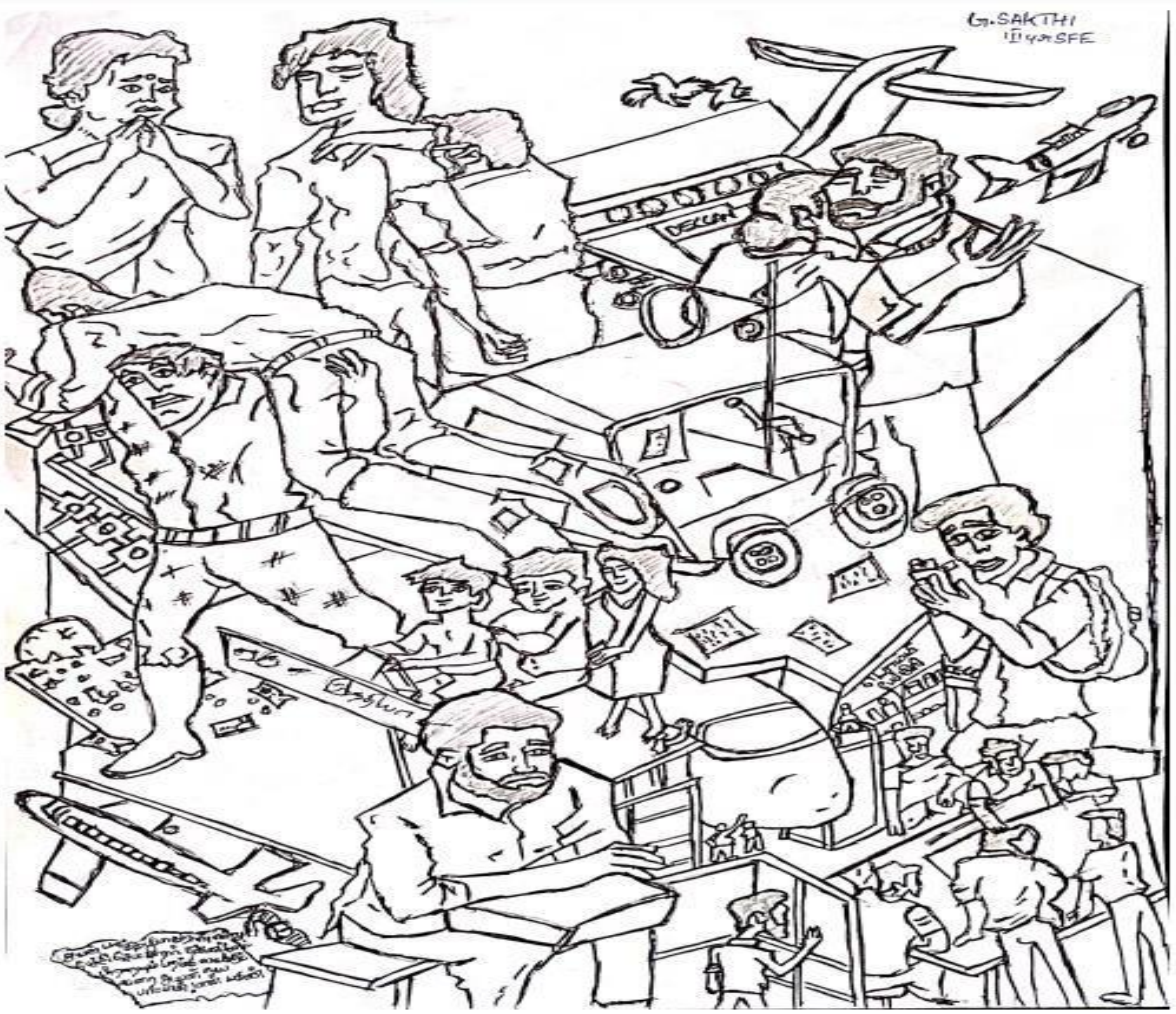
M. SRIKANTHRAJA
III-rd year
SFE

N. Jogeshwari...
III-SFE

N. VEERAMANI
III-rd year
SFE

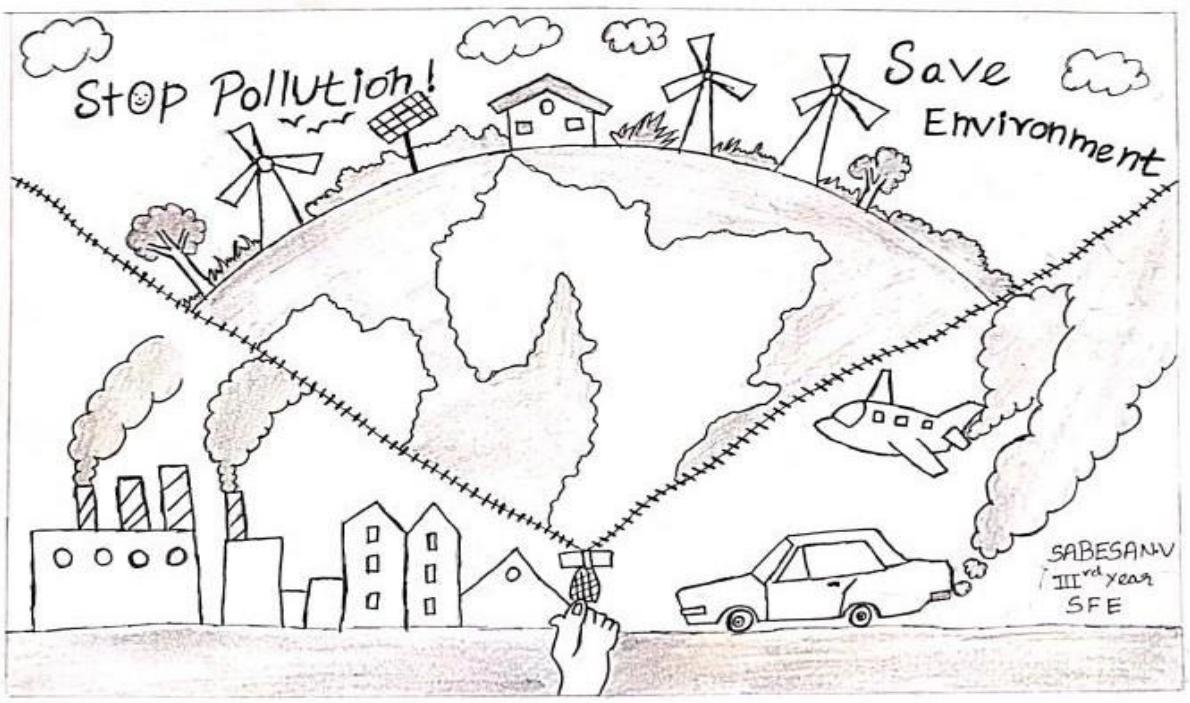


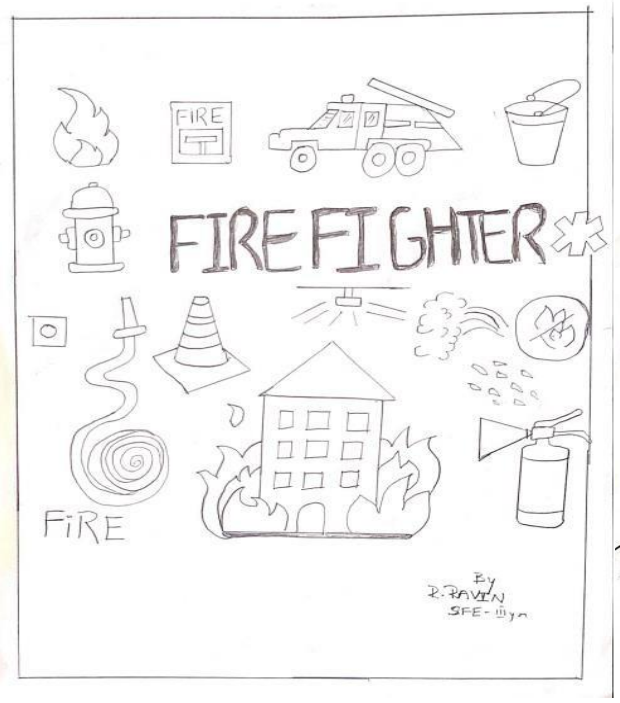
R. PARANTHAMAN
III-YEAR
SFE


G.SAKTHI
III year SFE

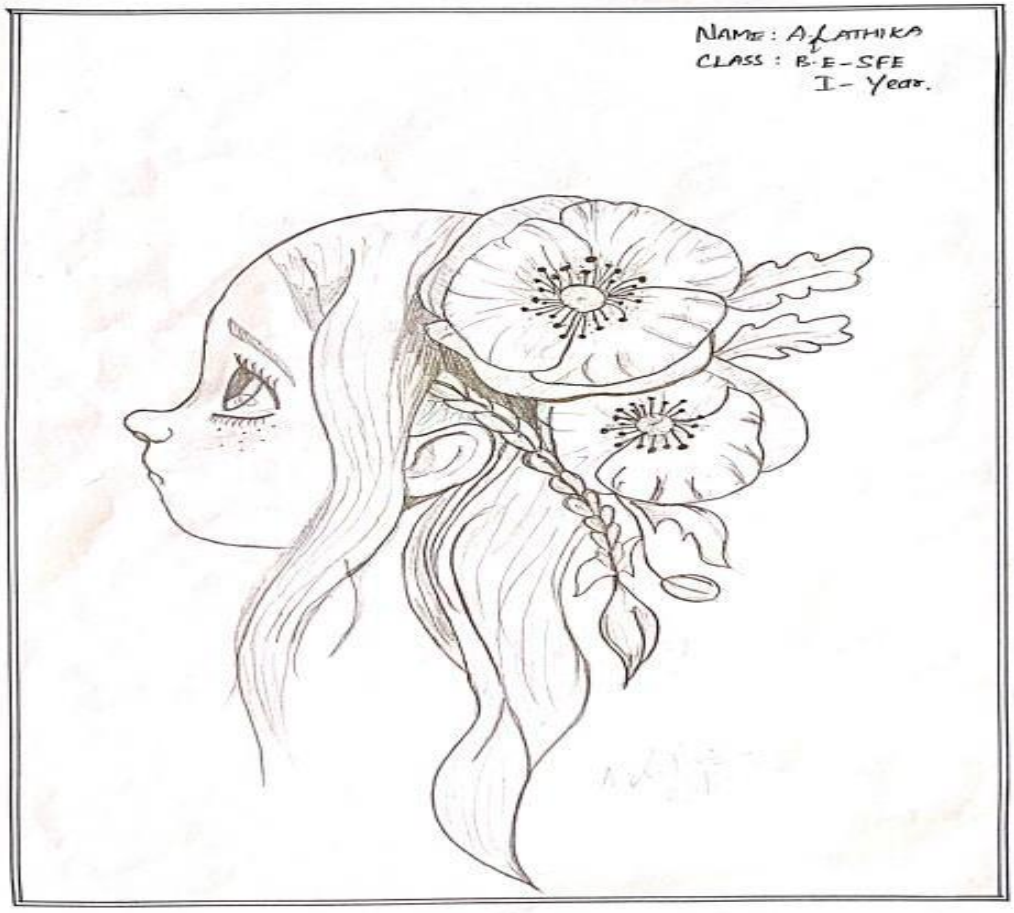

அவசரமாய் பயணிக்கையில்
அணைத்திருங்கள் அலைபேசியை
அடித்தாலும் மறுத்திருங்கள்
அடைப்பது ரயிலாக கூட
இருக்கலாம் !!!
TAMIL VANAN . Y
III rd year SFE

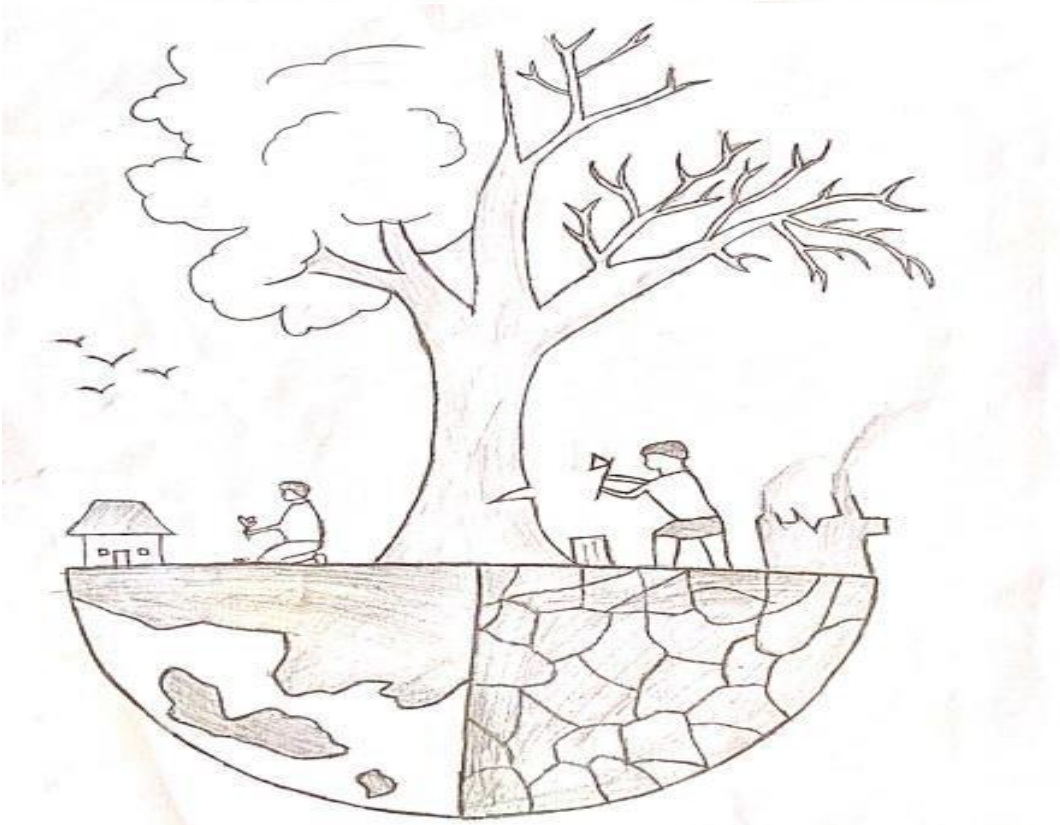

K. Bharath
III rd year
SFE


Stop Pollution!
Save Environment
SABESAN.V
III rd year
SFE


FIRE
FIRE FIGHTER
FIRE
By
R.RAVIN
SFE-III yr


N. Logeshwari
III - SFE





Save Nature

R. Deepak
IV - year
SFE

கவனமாக இருங்கள் தீயை
விலக்கவும்

கவனக்குறைவு தான்
விபத்துக்குப் பெரிய காரணம்.

மின் பாதுகாப்பு தீ
நல் வாழ்வைத் தூண்டுகிறது.

நெருப்பு எரிகிறது, எனவே
தீக்குச்சிகளுடன் விளையாட
வேண்டாம்.

தீ தடுப்பு என்பது சுய
பாதுகாப்பு.

புகை கட்டியாகும் முன்
வேகமாக வெளியேறு!

நெருப்பை விடும்போதும்
நம்பாதீர்கள்

மரத்தடி தீயை உங்களால்
மட்டுமே தடுக்க முடியும்!

Abish.M

தாய்க்கு பின்
தாரம் ஆனால்.
ஆனால் தந்தைக்கு
பின் மட்டுமே..
தந்தை
யாராலும் அந்த
இடத்தை
நிரப்ப முடியாது.

LATHIKA.A
B.E - SFE - 1st Year

பாதுகாப்பு கவிதைகள்

போதையாலே ஓட்டுனர்
பாதையாலே விபத்து

சாலையில் சாகச பயணம்
விபத்தாலே அகால மரணம்

தடுக்கப்பட வேண்டியது விபத்து
தடுத்துவிட்டால் இல்லை ஆபத்து

பெற்றோரின் சாலை விழிப்புணர்வு
பிள்ளைகளின் நல்வாழ்வு

பாதுகாப்பு உபகரணங்கள் அணிவது;
பணியாளர் கடமையில் முதன்மையானது!

சாலையில் செல்போன் பேச்சு
விபத்தினால் உயிரே போச்சு

பணியாளர் பாதுகாப்பில் விழிப்புணர்வு;
விபத்தை தடுக்கும் முதல் உணர்வு!

விபத்து நடந்துட்டா நாத்தியெட்டு
தூக்கம் வந்துட்டா ஓரம் கட்டு

விபத்தினை விதியென்று
தொலிவோம்;
ஆராய்ந்து மதிகொண்டு வெல்வோம்!

இப்படிக்கு

R.L. Dhivyan Bhalaji
II - SFE
2022 - 2026