

11<sup>th</sup> January 2024



# ENGINEERING EXPLORATION



**KLE Technological  
University** | Creating Value  
Leveraging Knowledge

Dr. M. S. Sheshgiri Campus, Belagavi



**ENGINEERING EXPLORATION TEAM**



MESSAGE FROM

## Vice Chancellor



KLE Technological University's constituent college at Belagavi received the first batch of undergraduate engineering students affiliated to KLE Tech during 2021. A new learning phase post pandemic demands more student-centric learning method as students are switching from online to offline mode of learning the engineering curriculum. The passion and potential in these students were harnessed through the innovative learning environment at KLE Tech. As always, the students, through their dedication, demonstrated their skills with a new project-based learning approach. As the semester ends, we celebrated their resounding success in the first-year course Engineering Exploration course.

The first-year course - "Engineering Exploration", designed by the Centre for Engineering Education Research is one of the signature courses at this University. This course focuses on engineering problem solving, multi-disciplinary skills required in Problem Solving and Teamwork.

In the very first year of the course delivery at KLE Tech. Belagavi campus, students from different Departments working with diverse group were opened to various ideas for solving the problem.

The interactive sessions during the course helped the students to learn skills required for an engineering graduate. The practice of exhibiting students' projects at the end of the semester helps students learn from their peers.

The exhibition titled "Prayog Shishir 2024" is being conducted on January 11th, 2024 at the campus. This exhibition is going to showcase 55+ course projects done by the first-year undergraduate engineering students of Electrical stream.

I congratulate students and faculty members for showing how perseverance breeds success.

**DR. ASHOK SHETTAR**

Vice-Chancellor,  
KLE Technological University, Hubballi.



# Engineering Exploration

@KLE MSSCET (KLE Tech, Belagavi Campus)

“Engineering Exploration” course is a unique innovation born in the educational ecosystem of KLE Tech.

This first-year course is co-designed and team taught by faculty members from multiple engineering disciplines. It focuses on problem solving, engineering design, multi-disciplinary skills, ethics and sustainability.

It follows PBL pedagogy and students work in teams to solve identified problems. All projects designed by students in this course are Arduino based and are built using several electrical and electronic components. The common actuators like DC motor, servo motor and stepper motors are used. Prayog is an exhibition conducted as a Prayog Shishir in the last week of odd semester.

It serves as a platform for peer learning and celebration of student’ success.

**Total of 55+ projects done by 250 first year students are being showcased in this event.**



MESSAGE FROM

# Principal



Engineering Exploration course is being implemented by KLE Technological University, Belagavi campus to encourage students to connect to real world engineering problems and offer innovative solutions by building products. The course offers students opportunity to experience entrepreneurial approach at First year level. By the time they complete undergraduate program students will have opportunities to convert these prototype products into commercial products and become successful entrepreneur. The main aim of this course is to explore ideas to transform knowledge into tangible objective, enhance teamwork and interpersonal skills, understand, and apply project management concepts and solve problems in society.

The First-year students have shown tremendous enthusiasm in this course learning and developed projects which are being exhibited on 11th January 2024.

I wish this event a grand success and congratulate students and faculty members for their continuous efforts.

**DR. S. F. Patil**

Principal

KLE Dr. M. S. Sheshgiri College of  
Engineering & Technology, Belagavi



Sl. No.	Title, Mentor Names and Need Statement
1	<b>Automatic Solar Panel Cleaning</b> <b>Prof. Abhinay Gupta</b> A BELGAUM based industry have installed roof top solar panel at their premises they want to have one automatic solar panel cleaning machine.
2	<b>Semi Automatic Sorting Machine</b> <b>Prof. Ramesh Katti</b> Scrap dealer wants a machine to sort different scrap materials.
3	<b>Mini Windmill Power Generation</b> <b>Dr. Swati Mavinkattimath</b> A Belagavi based industry needs a technique to install mini windmill on the top of the terres to generate a nominal amount of power for their small scale industrial purpose.
4	<b>Automatic Drill Bit Dispenser</b> <b>Prof. Sushant Jadhav</b> A Belagavi based small scale industry wishes to have an automatic drill bit dispenser machine.
5	<b>Smart Window System</b> <b>Prof. Amey M. Muchandi</b> Houses / Industries require a smart window system which operates autonomously based on environmental and LPG leakage conditions.
6	<b>Loading and Unloading</b> <b>Dr. Ravishankar N Chikkangoudar</b> A private firm wanted a automatic or semi automatic loading and unloading machine to reduce the labor effort and Increase productivity, safety.
7	<b>Automatic Floor Cleaning</b> <b>Prof. Sandeep Kudal</b> A company named "YZ", is in need of automatic cleaner for the factory floor
8	<b>White/Black Board Cleaner</b> <b>Prof. Tushar Birje</b> A Belagavi based college need automatic or semiautomatic White/Black Board cleaner to reduce Human work and time.
9	<b>Automatic Filling Machine</b> <b>Prof. Niranjn Muchandi</b> A Belagavi based manufacturing industry requires an Automatic Filling Machine to address challenges related to accuracy and labor costs offering precise filling while reducing labor dependency and maintaining hygiene standards.
10	<b>Wall Painting Machine</b> <b>Prof. Niranjn Pattar</b> A painting contractor needs a device which will help the manual painter to paint the walls of tall buildings to avoid the risk of accidental death.



Sl. No.	Title, Mentor Names and Need Statement	
11	<b>Innovative Toy with launching mechanism</b>	<b>Prof. Sandeep Kudal</b>
	"S n K" Toy Company is in need of an innovative toy for children to be made, which involves mechanism and launches certain objects, this toy is safe for the kids to play with.	
12	<b>Cup Crushing Machine</b>	<b>Prof. Vijay Rayar</b>
	An College canteen is in need of cup crushing machine , which can reduce the efforts of garbage collector and dump it in waste container.	
13	<b>Vending Machine</b>	<b>Prof. Amey M. Muchandi</b>
	A Belagavi based Multiplex needs a Vending Machine to reduce labor costs, minimize downtime, optimize inventory management.	
14	<b>Semi Automatic Card Sheet Cutting Machine</b>	<b>Prof. B G Koujalagi</b>
	College Xerox centre needs a card sheet cutting machine that can cut the card sheets of required size.	
15	<b>Vegetable Cutting Machine</b>	<b>Prof. Priya S Murgod</b>
	College canteen/mess needs a semi-automatic vegetable cutting machine that can have high productivity, avoid time consuming manual process and the risk of accidents while cutting.	
16	<b>Trash Collector and Compressor</b>	<b>Prof. Sandeep Kudal</b>
	A waste management agency named "Z-Company", is in need of an automatic trash collector and compressor system.	



## AUTOMATIC SOLAR PANEL CLEANING

**Mentor** : **Prof. Abhinay Gupta**

**Need Statement** : **A BELGAUM based industry have installed roof top solar panel at their premises they want to have one automatic solar panel cleaning machine.**

**Abstract** : The Automatic Solar Panel Cleaning System is an innovative project aimed at improving the efficiency and longevity of solar panels by automating the cleaning process. Solar panels are a popular and sustainable source of energy, but their performance can be significantly affected by the accumulation of dirt, dust, and other debris on their surface. Regular cleaning is essential to ensure optimal energy production, but manual cleaning can be time-consuming, labour-intensive, and costly. This project proposes a solution to address these challenges by developing an automated system that cleans solar panels effectively and efficiently. The system utilizes a combination of technology, sensing mechanisms, and intelligent algorithms to detect and remove dirt from the surface of solar panels without human intervention. The core components of the system include an Arduino, motors equipped with brushes or wipers, sensors for detecting dirt accumulation, and a control system that orchestrates the cleaning process. The proposed system offers several advantages over manual cleaning methods. It eliminates the need for human labour, reducing operational costs and increasing the efficiency of solar panel maintenance. Moreover, the automation enables frequent and timely cleaning, preventing the built-up of dirt and maximizing the energy output of the panels."



Engineering exploration applies theoretical concepts to real scenarios, fostering creativity, teamwork, and diverse skill development. It teaches us to construct working models meeting needs efficiently and prepares us for time-bound tasks.

**Supriya S Deevatagi**



The engineering exploration course gave us a valuable experience in project management, and engineering design concepts.

**Museb Mohidulislam Shaikh**

Through this Ceer lab, we learned about teamwork, problem-solving, and time management. We faced technical glitches but gained valuable experience for future projects.

**Vikram Raghu Patil**

## SEMI AUTOMATIC SORTING MACHINE

**Mentor** : **Prof. Ramesh Katti**

**Need Statement** : **Scrap dealer wants a machine to sort different scrap materials.**

**Abstract** : A semi-automatic sorting machine is a device that helps in organizing or segregating items based on certain criteria or characteristics. It typically involves a combination of automated processes and human intervention. These machines often use sensors, conveyors, and mechanical components to sort items, with human operators assisting in certain stages of the sorting process. They're commonly used in industries such as manufacturing, recycling, agriculture, and logistics to streamline and improve sorting efficiency.



Engineering Exploration provides students with a broad overview of different engineering disciplines. The subject incorporates practical experiences such as hands-on projects.

The course provides valuable insights into engineering processes and helps in establishing a strong foundation in programming and mechatronics through practical implementation. It is based on team work, time management and problem solving. We had a great time learning new skills.

**Anuja Killekar**

As exploration demonstrates a solid understanding of the background and context. The innovative approach we took in [specific aspect] is noteworthy. It shows creativity and a willingness to explore unconventional solutions. It actually led to effective communication, our documentation and presentation were clear and well-organized. The use of visuals, diagrams, and explanations enhanced the overall clarity of our exploration and helped in increasing our practical skills overall. It was a happy learning.

**Varun C. M.**

In the Engineering Exploration course we were navigated through a broad spectrum of every engineering discipline, blending knowledge with hands-on projects. This not only enriched understanding but also established a solid footing in programming and mechatronics through practical application. The collaborative elements of teamwork, time management and problem-solving were clearly integrated, enhancing the overall experiential learning.

It's apparent that our team found the journey enjoyable while acquiring valuable new skills.

**Amruta Gaitonde**

## MINI WINDMILL POWER GENERATION

**Mentor** : **Dr. Swati Mavinkattimath**

**Need Statement** : **A belagavi based industry needs a technique to install mini windmill on the top of the terres to generate a nominal amount of power for their small scale industrial purpose.**

**Abstract** : Renewable energy has been in increasing demand recently due to over-stress on non-renewable resources and their increasing cost. Thus producing electricity with the use of renewable resources wind energy has been taken up in this project. A Windmill, which rotates when there is enough wind, generates electricity owing to magnetic coupling between the rotating and stationary coil. A horizontally rotating prototype of Windmill is being used in this project. Mini Windmill Power Generation Project harnesses the Windmill i.e., Wind Turbine Generator to charge a 12V Battery. The Windmill, when in enough wind to drive it, generates power enough to charge a battery. Since it can work in favorable natural conditions by itself without consuming fossil fuel, it can charge the battery automatically and that too without any harmful emissions. Thus this project is an example of how natural resources like wind energy can be efficiently harnessed to produce electricity in harmony with nature.



Engineering Exploration is a Team-taught course that focuses mainly on Hands-On projects where all the team members come up with their own ideas. It focused on Problem Solving, Engineering Design, and Multi-Disciplinary Skills

**Prajwal Shetgar**



Engineering exploration was a completely different and unique experience for all of us. It inculcated team spirit, exhibited creativity and innovation showcasing our ability to think critically.

**Nishchal M Hosamani**

It was amazing experience learnt about designing and implementing the same

**Samarth Patil**

## AUTOMATIC DRILL BIT DISPENSER

**Mentor** : **Prof. Sushant Jadhav**

**Need Statement** : **A Belagavi based small scale industry wishes to have an automatic drill bit dispenser machine.**

**Abstract** : The automatic drill bit dispensing machine is an innovative solution designed to automate the process of dispensing drill bits in industry. This project aims to address the challenges faced by industry workers in manually handling and distributing drill bits. The machine utilizes a storage container for holding a large quantity of variety of drill bits. The automatic drill bit dispensing machine combines the use of a servo motor or DC motor, an ultrasonic sensor or IR sensor, conveyor belt or a rack and pinion mechanism to create a reliable and efficient drill bit dispenser. The servo motor or DC motor acts as the driving force in the system, providing controlled and precise movement to the dispenser mechanism. The rack and pinion or conveyor belt mechanism is employed to convert the rotational motion of the DC motor into linear motion, allowing for the controlled release of drill bits. The rotation of the DC motor drives the pinion gear, which engages with the rack, causing it to move in a linear direction. As the rack moves, it pushes the drill bits forward, facilitating their dispensing into a tray or container. The implementation of this automatic drill bit dispensing machine offers several advantages, including convenience and accuracy. This project not only showcases the application of engineering principles but also addresses the need for automation and convenience in everyday tasks.



In Engineering Exploration lab, we analyze real life problems and solve them by using the technical knowledge. We also learn how to work and co-operate with team, social interaction, time management and how the work should be done systematically.

**Aniket Patil**



The engineering exploration course has been an amazing learning experience for me, and the Bhel mixing machine project was the highlight of the semester. It was great to be able to apply the engineering concepts we learned in class to a real-world project.

**Neha Mulgund**

Participating in Engineering Exploration classes proved highly beneficial, providing us with valuable insights and knowledge. The significance of teamwork became evident throughout the course. My team and mentor played vital roles; without their support, the project would be incomplete. Team collaboration allowed us to exchange creative ideas, enhancing the overall project.

**Sudeep Kase**

## SMART WINDOW SYSTEM

**Mentor** : Prof. Amey M. Muchandi

**Need Statement** : Houses / Industries require a smart window system which operates autonomously based on environmental and LPG leakage conditions.

**Abstract** : The project aims to develop a Smart Window System for residential and industrial applications, integrating autonomous control through an Arduino Mega board. The system operates based on environmental conditions and LPG gas leakage detection, enhancing safety and energy efficiency. The Arduino Mega board facilitates real-time monitoring and decision-making. The system incorporates sensors to detect room temperature, triggering the window to open if the temperature exceeds a predefined threshold, promoting ventilation and climate control. Additionally, it employs LPG gas sensors to identify potential leaks within the room. In the event of a gas leak, the system autonomously opens the window to facilitate gas dispersion and enhance safety measures. Furthermore, the Smart Window System integrates rain sensors to detect precipitation. If it detects rain, the window will automatically close to prevent water ingress, safeguarding the interior environment. The autonomous functionality of the system enhances user convenience and promotes a secure and comfortable living or working space. This project addresses the need for an intelligent window control system that responds dynamically to environmental factors such as temperature, LPG gas leakage, and rain. The utilization of an Arduino Mega board ensures efficient monitoring and control, contributing to both safety and energy conservation in residential and industrial settings.



The Engineering exploration project on the smart window system brought engineering concepts to life, making the course both engaging and applicable to real-world scenarios.

**Saurabh Tawani**



I found the Project work transformative. Addressing challenges in the Smart Window System improved my problem-solving abilities, making the course a crucial part of my academic journey.

**Sangamesh Sannappanavar**

The Engineering Exploration course made abstract concepts tangible. Crafting a Smart Window System showcased the practical side of engineering, making this course an enriching learning experience.

**Soujanya Patil**

## LOADING AND UNLOADING

**Mentor** : **Dr. Ravishankar N Chikkangoudar**

**Need Statement** : **A private firm wanted a automatic or semi automatic loading and unloading machine to reduce the labor effort and Increase productivity, safety.**

**Abstract** : The efficient movement of goods is essential in numerous industries, from manufacturing and warehousing to shipping and construction. To achieve this, a variety of material handling equipment is employed, each with its unique advantages and limitations. This abstract compares and contrasts three prominent options: robotic arms, forklifts, and cranes. Robotic arm have automated manipulators, often resembling human arms, are equipped with grippers or specialized end effectors for grasping and maneuvering objects. Robotic arms excel in handling delicate or oddly shaped objects with high accuracy and repeatability. Robots minimize human exposure to hazardous environments or repetitive strain injuries. Forklift have forks that slide under and lift palletized goods or other large objects. Forklifts enable rapid loading and unloading, particularly for standardized palletized cargo. Compared to robots, forklifts offer a lower initial investment and maintenance cost. Cranes uses a boom and hoist to lift and move heavy objects over large distances. Cranes can handle the heaviest and bulkiest cargo, exceeding the capabilities of robots and forklifts. Cranes can be equipped with various attachments like hooks, magnets, and grapples for diverse tasks. The optimal choice among robotic arms, forklifts, and cranes depends on the specific task requirements. Consider factors like load type, weight, workspace layout, budget, and desired precision. Robotic arms excel in intricate handling, forklifts prioritize efficiency for palletized goods, and cranes reign supreme for massive loads and long distances. Understanding the strengths and weaknesses of each equipment empowers informed decisions for efficient and safe loading and unloading operations.



The Engineering Exploration course taught us how to collaborate in a team, manage our time, and use controllers and mechanisms to build a prototype.

**Pratidnya**

Through project-based learning, engineering exploration taught me how real-world projects are completed in the business with tools like Autodesk, Github, Agile methodology, controllers, and sensors, etc.

**Sourabh Subhedar**



In the course Engineering Exploration, I learned how to turn a need statement into a functional prototype.

**Ujwal**

## AUTOMATIC FLOOR CLEANING

**Mentor** : **Prof. Sandeep Kudal**

**Need Statement** : **A company named "YZ", is in need of automatic cleaner for the factory floor**

**Abstract** : Automatic floor cleaner is a system that enables cleaning of the floor by the help of highly stabilized and rapidly functionalized electronic and mechanical control system. Current projects work, targets to use automatic floor cleaner for large floor in house-hold purposes and office floors. The cleaning purpose is specifically carried out by continuous relative motion between a scrubber and the floor surface. Automatic floor cleaner is an automated machine that facilitates the user to keep their place clean and hygienic. Many industries are working in the automation field to make autonomous cleaners. Now a day's major emphasis is given on the field of robotics for decreasing human efforts. We have developed floor cleaner which will be fully automatic providing dry and wet cleaning. The current market is occupied by cleaners with only one or two functionality. For its cost reduction and simplicity, we are using Arduino. The cleaner will be a step for providing comfortable life by resolving problems in traditional floor cleaning methods. We have used various mechanisms thereby making them mechatronics projects, like rack and pinion mechanism, chain drive mechanism, lead screw mechanism etc. Here in our projects we have combined programmable controllers with sensor and motor drives. We have movement of machine which can be controlled by Bluetooth module, or path following with IR sensor. Also we have developed an app with which we control the movement of our machine.



I have learnt many things in exploration lab like, connections and communications with friends and also time management.

**Nagaraj Guduguntikar**



Engineering exploration course provided us a very good experience, it was new to me to handle many machines and communicating with my classmates.

**Mahantesh Hampiholi**

We were able to think outside the box and even think like engineers, from the scratch we were able to write code and also learnt working together in a team, also learnt project management.

**Jason Nathan Kalbandi**

## WHITE/BLACK BOARD CLEANER

**Mentor** : **Prof. Tushar Birje**

**Need Statement** : **A Belagavi based college need automatic or semiautomatic White/Black Board cleaner to reduce Human work and time.**

**Abstract** : This Project introduces an innovative Automatic White/Black Board Cleaner System (AWBCS) driven by Arduino technology, designed to enhance classroom efficiency by automating the traditional manual board cleaning process. The proposed system integrates a smart cleaning mechanism with an Arduino microcontroller, offering a hands-free solution for educators to maintain a clean teaching surface. The AWBCS employs a combination of stepper motors, brushes, and sensors to navigate and clean the board systematically. The Arduino microcontroller orchestrates the cleaning sequence, ensuring comprehensive coverage while avoiding collisions with obstacles such as chalk holders or erasers. Infrared sensors are incorporated to detect the board's dimensions and dynamically adjust the cleaning path for optimal coverage. The system's operation can be initiated through a user-friendly interface, either on the device itself or remotely via a mobile application, allowing teachers to schedule cleaning sessions at convenient times. This automation not only saves valuable instructional time but also contributes to a more hygienic learning environment by minimizing dust and allergens associated with manual erasing. Experimental results demonstrate the effectiveness of the AWBCS in efficiently and thoroughly cleaning white/black boards. The system's low-cost design, ease of implementation, and potential for integration with existing classroom technologies make it a promising solution for educational institutions seeking to enhance classroom management and hygiene.



Learnt about engineering ethics and sustainability in engineering.

**Tejaswini Gawade**



Learnt team work and Management.

**Shreyash Sintre**

The Engineering exploration course has thought me how to overcome real-world problems

**Harsh Bandekar**

## AUTOMATIC FILLING MACHINE

**Mentor** : **Prof. Niranjan Muchandi**

**Need Statement** : **A Belagavi based manufacturing industry requires an Automatic Filling Machine to address challenges related to accuracy and labor costs offering precise filling while reducing labor dependency and maintaining hygiene standards.**

**Abstract** : The project titled "Automatic Filling Machine" addresses the pressing needs of a manufacturing industry based in Belagavi. This industry is confronted with challenges pertaining to accuracy in filling processes, escalating labor costs, and the imperative of adhering to stringent hygiene standards. To surmount these hurdles, the proposed solution is a Mechatronic Automatic Filling Machine. This innovative system aims to provide a precise and efficient filling mechanism, mitigating the human error associated with manual processes. By incorporating advanced technology, the project seeks to minimize labor dependency, thereby addressing the rising costs associated with human resources. At its core, the Automatic Filling Machine utilizes an Arduino controller, signifying a seamless integration of electronics and mechanics. This choice of controller ensures a robust and adaptable system that can be programmed to meet specific industry requirements. The mechatronic design not only enhances accuracy but also contributes to increased productivity, allowing the industry to optimize its resources effectively. Additionally, the automation of the filling process contributes to maintaining the highest hygiene standards, a critical factor in industries dealing with sensitive products. The Automatic Filling Machine project offers a comprehensive solution to the industry's challenges, providing a reliable, accurate, and cost-effective alternative to manual filling processes. Through the incorporation of Arduino-based control, it stands as a testament to the synergy between mechatronics and modern technology in addressing real-world industrial needs.

The Exploration lab was an outstanding engineering learning experience, fostering teamwork, idea implementation, and communication skills. Mentors played a crucial role, making it an enjoyable journey in the Thinkering lab

**Saurabh Tawani**

Exploration Lab provided invaluable lessons in engineering, teamwork, and effective communication. Mentors played a vital role, making it a fulfilling and enjoyable experience, enhancing our skills significantly.

**Keerti Mahantshetti**



The Exploration lab was a brilliant learning opportunity, enhancing teamwork, communication, and project implementation skills. Mentors were instrumental in making it an enriching experience in the Thinkering lab.

**Pallavi Bhat**

## WALL PAINTING MACHINE

**Mentor** : Prof. Niranjan Pattar

**Need Statement** : A painting contractor needs a device which will help the manual painter to paint the walls of tall buildings to avoid the risk of accidental death.

**Abstract** : The Arduino-Based Automatic Wall Painting Machine is an innovative project that merges modern technology with traditional construction practices. Leveraging the versatility of Arduino microcontrollers, this automated system transforms the labor-intensive task of wall painting into an efficient and precise process. The project integrates key components such as stepper motors, sensors, and a user interface, providing users with a customizable platform for defining painting parameters. The core functionality of the system involves the Arduino microcontroller orchestrating the synchronized movement of stepper motors along both horizontal and vertical axes. A user-friendly interface facilitates the input of painting preferences, including color selection, design patterns, and coverage area. This Arduino-based innovation brings forth several advantages, notably in terms of time and labor savings. By automating the painting process, the project aims to enhance efficiency and reduce human involvement, making it an appealing solution for large-scale painting projects. The precision afforded by the system ensures uniform and high-quality painting results, addressing common challenges associated with manual painting methods. In conclusion, the Arduino-Based Automatic Wall Painting Machine presents a forward-thinking solution to streamline and revolutionize traditional painting practices. Through the integration of Arduino technology, this project offers a reliable and customizable approach to wall painting, contributing to increased efficiency and improved outcomes in the construction and home improvement sectors.



Exploration was wonderful experience, taught us about time management

**Satyam Savarna**



We understood the importance of team work and also PBL methodology

**Rashmi Ravindra Halkarni**

We learnt Scrum Methodology and also the importance of Engineering design process

**Aniket Sanjay Patil**

## INNOVATIVE TOY WITH LAUNCHING MECHANISM

**Mentor** : Prof. Sandeep Kudal

**Need Statement** : "S n K" Toy Company is in need of an innovative toy for children to be made, which involves mechanism and launches certain objects, this toy is safe for the kids to play with.

**Abstract** : Launching mechanism toys offer a hands-on experience that encourages experimentation, logical thinking, and the application of scientific principles. Children learn best when they are engaged and having fun. Children develop motor skills, spatial awareness, and an understanding of cause and effect. This innovative toy combines fun and education by enabling children to explore the principles of physics, engineering, and problem-solving through play. Here in our projects we have combined programmable controllers with sensor and motor drives. We have movement of machine which can be controlled by Bluetooth module and launching system which can engage the children in having fun. We have developed an app with which we control the movement of our toy, once in position it will launch a paper plane. In another project a missile (Soft toy) launcher is prepared, which is a ballistic device used to launch a projectile at a distance without the aid of any propellants to target the enemy gates in a game. We have developed a Table tennis ball launcher as well which will help the user to play without any opponent, thereby providing fun to users while playing and also educating by enabling children to explore many ideas is the motto of these projects. All the projects involve various mechanisms enabled with electronics involving IR, ultrasonic sensors etc. One can also use this project to learn about energy. The ball needs kinetic energy, the energy of motion, in order to fly through the air.

Engineering Exploration made us understand the working of complicated machines in simple ways, we understood time management

**Sangamesh Shankar Sattikar**



Meeting new project members and learning to work in team was new, and understood the power of team effort

**Mahima Surendra Kamble**



Hands on work with the understanding of concepts. Learning by making the model was very helpful in studying new concepts

**Aditya Vijay Patil**

## CUP CRUSHING MACHINE

**Mentor** : **Prof. Vijay Rayar**

**Need Statement** : **An College canteen is in need of cup crushing machine , which can reduce the efforts of garbage collector and dump it in waste container.**

**Abstract** : The Arduino-based cup crushing machine with different mechanisms is an innovative solution designed to efficiently and autonomously crush disposable cups, contributing to waste reduction and recycling efforts. This automated system employs various mechanisms to address different cup types and sizes, enhancing versatility and adaptability. The integration of Arduino microcontroller technology facilitates precise control, monitoring, and customization of the crushing process. The machine incorporates multiple crushing mechanisms to accommodate diverse cup materials, such as plastic, paper, and foam, ensuring efficient and eco-friendly disposal. A motorized conveyor system transports cups to the crushing chamber, where different crushing mechanisms are selectively engaged based on cup characteristics. These mechanisms include rotary blades, compression modules, and vibrational elements, providing flexibility to handle cups made of various materials. The Arduino microcontroller serves as the central intelligence unit, orchestrating the entire crushing process. Additionally, sensor feedback mechanisms, including Infrared (IR) sensors and ultrasonic sensors. To enhance user interaction and control, the mobile app is developed using MIT app inventor, which demonstrates the user-friendly interface. This interface allows operators to monitor the machine's status, adjust settings, and receive real-time feedback on the crushing process. Moreover, the system can be integrated with IoT capabilities, enabling remote monitoring and control for increased efficiency. The Arduino-based cup crushing machine not only addresses environmental concerns related to cup waste but also gives the indication upon the storage becoming full to the user which may promotes the adoption of automated recycling solutions in future. Its versatility in handling different cup materials and sizes, coupled with the user-friendly interface and programmability, positions it as a sustainable and adaptable solution for reducing the environmental impact of disposable cup disposal.

It was wonderful experience, we learnt new methods in completing projects with engineering design concepts

**Suraj Nitin Salunkhe**

Engineering Exploration course enhanced our ability to understand, think and solve the problems

**Nakshatra G**

Thinkering lab has taught us many things, it has been such a platform that has lead us each member of the group to think differently and innovatively

**Bhagyavathi Shetty**



## VENDING MACHINE

**Mentor** : **Prof. Amey M. Muchandi**

**Need Statement** : **A Belagavi based Multiplex needs a Vending Machine to reduce labor costs, minimize downtime, optimize inventory management.**

**Abstract** : This Engineering Exploration project endeavors to develop a specialized Multiplex Vending Machine for a Belagavi-based cinema, utilizing an Arduino Mega board for precise control. The system aims to automate the dispensing of chocolates, enhancing the efficiency and convenience of the cinema's concessions. The Arduino Mega board serves as the central control unit, overseeing real-time monitoring and execution of the vending process. Employing sophisticated automation technology, the system will intelligently dispense chocolates upon user interaction, providing a seamless and user-friendly experience. This project is poised to bridge the gap between theoretical knowledge and practical application, offering students hands-on experience in designing, implementing, and fine-tuning an automated solution. By tailoring the system to the regional context of a multiplex in Belagavi, the project emphasizes the practical relevance and adaptability of engineering solutions to meet specific industry needs. The Vending Machine project intends to revolutionize the concession experience by introducing a smart and efficient system. The utilization of the Arduino Mega board ensures precise control, allowing for a seamless integration of automation technology to enhance the overall cinema experience in Belagavi.



The Vending Machine project was transformative in my Engineering Exploration journey. This was a multidisciplinary system showcased the practical side of automation, making it a highlight of my studies.

**Harsh V. Othy**



Exploring the world of automation using Multiplex Vending Machine project was both challenging and insightful. The Arduino Mega board allowed us to implement sophisticated control in dispensing chocolates.

**Advita V. Patil**

Constructing a Vending Machine using a multidisciplinary approach was an exciting Engineering Exploration. Real-world application of automation skills made this project exceptionally engaging.

**Samarth Badavanache**

## VENDING MACHINE

**Mentor** : **Prof. B G Koujalagi**

**Need Statement** : **Semi Automatic Card Sheet cutting Machine**

**Abstract** : This work describes the design and fabrication of a card sheet cutting machine. The main components of this low cost machine are an arduino controller, DC motors, Stepper motors and motor drives. The working of this system is based on source codes. Cutting perfect size card sheets by hand can now be done by machines too. Here we propose a semi automatic card sheet cutting machine that can cut the required size card sheet with more accuracy. The proposed system makes use of an arduino based circuit that is interfaced with motors and belt, gear and lead screw based setup that is used to provide the mechanism needed by a blade to cut the card sheet. The arduino based circuit is interfaced with DC & stepper motors to transmit the movement commands as per the code fed to it. It then controls the cutting process through a well controlled mechanism to achieve the task. DC motor feeds the paper to the cutter and Stepper motor slides the cutter to cut the paper. The user will enter the data like how many strips of the required size need to be cut.



Its great to tell that our engineering exploration lab focused on practical aspects including the development of course project, gaining insights into mechanical engineering. It also prepared us for real world engineering challenges.

**Samiksha Patil**



We get to learn about many new things and to work in team. It builds communication skills and coordination with the other team members and management of project work.

**Bhargavi A K**

We had good experience in the Engineering Exploration and got a chance to explore many things. Enjoyed working with Team and time management. Engineering Exploration helped me to gain self confidence and exposed us to new concepts like Engineering design and different mechanisms. Overall it was student teacher interaction.

**Srushti Bandi & Parth Nakadi**

## VEGETABLE CUTTING MACHINE

**Mentor** : **Prof. Priya S Murgod**

**Need Statement** : **College canteen/mess needs a semi-automatic vegetable cutting machine that can have high productivity, avoid time consuming manual process and the risk of accidents while cutting**

**Abstract** : The vegetable cutting machine is a sophisticated culinary apparatus designed to revolutionize the process of vegetable preparation. Its intricate design involves precision-engineered cutting mechanisms that cater to a variety of vegetables. Employing advanced technology, the machine ensures uniform and efficient cuts, significantly reducing the consumption of time and effort required in a kitchen. Constructed with durable materials, the machine prioritizes safety through integrated features, guaranteeing secure operation for the users. Its versatility allows the processing of wide range of vegetables contributing to enhanced culinary efficiency. In our course project, we are using the gear mechanism. Innovative elements like adjustable cutting styles and customizable settings, provide adaptability to diverse culinary needs. This machine not only streamlines kitchen operations but also addresses economic and environmental concerns by minimizing food waste through precise cutting. In commercial kitchens, the vegetable cutting machine becomes a pivotal tool for chefs and cooks, facilitating faster food preparation



I had a new experience in this exploration lab, where I learnt some new concepts which were helpful in our course project. I, also got an opportunity to share my ideas while designing our project. I got confidence to interact with people and it helped me to enhance my communication skills

**Sindhu**



It was a complete new experience, where I learnt many new mechanisms, sensors and actuators and how to apply them to build a model. I also learnt to work in team, with improvement in my presentation skills, thus boosting my confidence

**Vaishnavi Muttangi**

The exploration sessions have taught me how the engineer should be professionally. From the ethics session, I learnt the responsibilities of an engineer and the code of conducts. We got very good knowledge and guidance from the mentors in the exploration lab.

**Shashank**

## TRASH COLLECTOR AND COMPRESSOR

**Mentor** : **Prof. Sandeep Kudal**

**Need Statement** : **A waste management agency named “Z-Company”, is in need of an automatic trash collector and compressor system.**

**Abstract** : The rapid growth in the population has also led to the surge in the volume of waste being generated on a daily basis. This increase in the generation of waste due to continuous growth in the urbanization and industrialization has become a severe problem for the local and the national government. It is also posing a serious problem for the local authorities to manage the wastes being dumped everywhere as landfill. To ensure the minimal risk to the environment and human health, it is necessary to take meticulous measures when segregating and transporting waste. Segregation of waste in a proper manner brings to the limelight actual economic value of the waste. The traditional method used for segregating of waste in India is through rag pickers which are time-consuming and can have adverse effects on the health of the people who are exposed to such wastes. Here we propose the use of an Auto Waste Segregator which is cheap and also an easy to use solution for segregation of household waste. It is designed to segregate the waste dry and wet waste. The system makes use of moisture sensor for the segregation of wet and dry waste and an LCD display for displaying the result of segregation. In one project we compress the collected waste and then send for recycling. Here in our projects we have combined programmable controllers with sensor and motor drives. We have movement of machine which can be controlled by Bluetooth module. Also we have developed an app with which we control the movement of our machine.



Problem Based Learning approach was introduced to us and we learnt how to develop a solution based on problem

**Lomesh Kumar Jangde**



Understood project management techniques, Agile methodology, Scrum etc., understood about working in team, also learnt about sustainability and ethics, thereby making us a responsible engineer

**Shrigouri Ravindra Chikkamath**

Engineering exploration course is very well structured, made us learn by introducing to engineering and also by hands on project building, learning was fun as theory was implemented

**Spurti Manojkumar Mogali**



The Supporting staffs helped us to get the shape of our virtual model to reality. They were very kind and excited while teaching us to run the machineries during Thinkering Lab sessions.

**Prasad**



The supporting staffs were like co-mentors for our students. They were found co-operative and helpful during all the sessions of Engineering Exploration for both students and teaching staffs.

**Prof. S. B. Kulkarni**

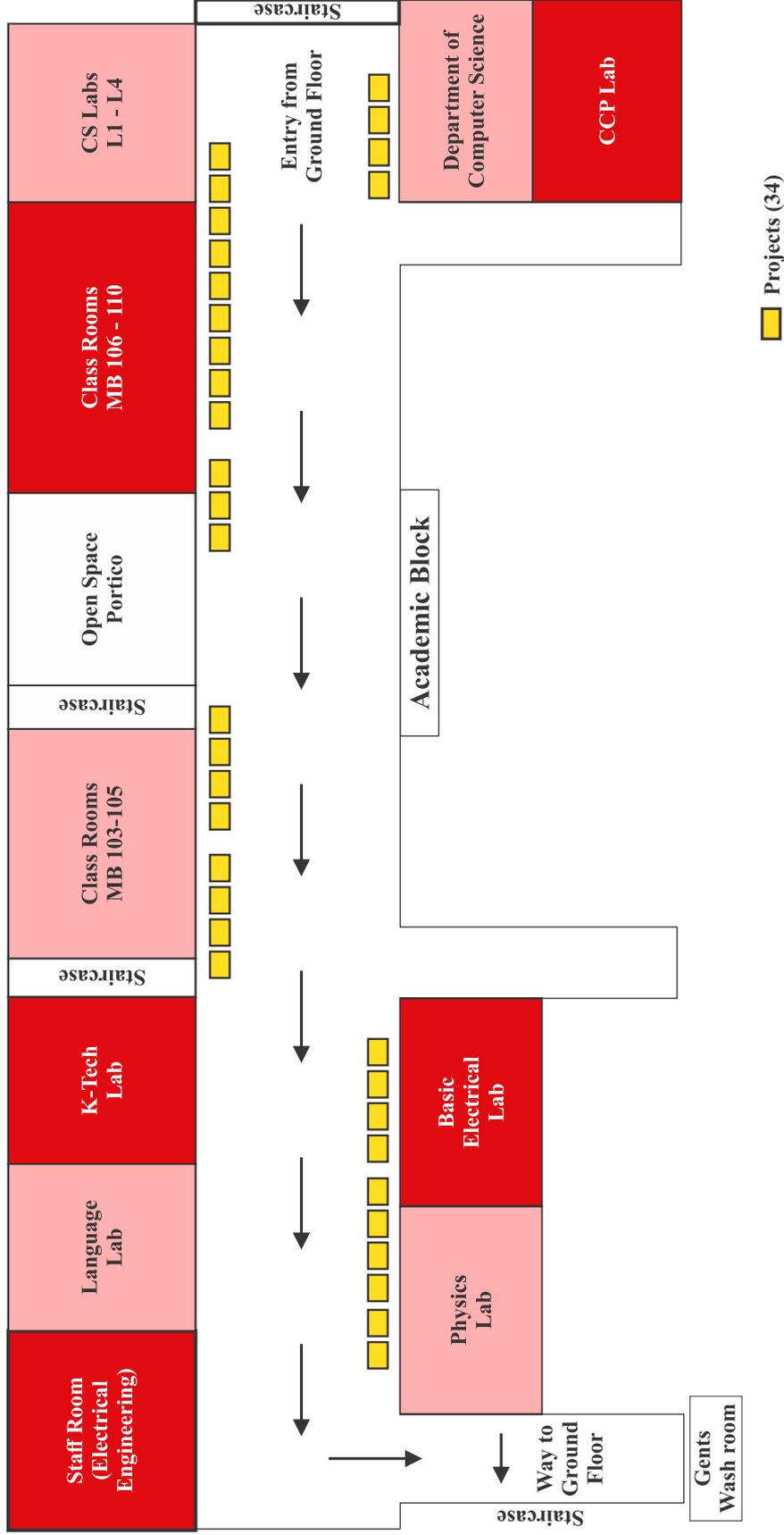
## Unseen Hands of Exploration

As Engineering Exploration enters its First year of delivery, its also time to show our gratitude to our support staff for their relentless contribution to support student learning in the Engineering Exploration Learning Studio and Thinkering Lab. From readying the mechatronic learning kits in the studio to helping students operate the tools and equipments in the Thinkering Lab, the support staff have been the spine of this course.

We thank them for their enthusiastic perseverance in contributing to successful student learning.

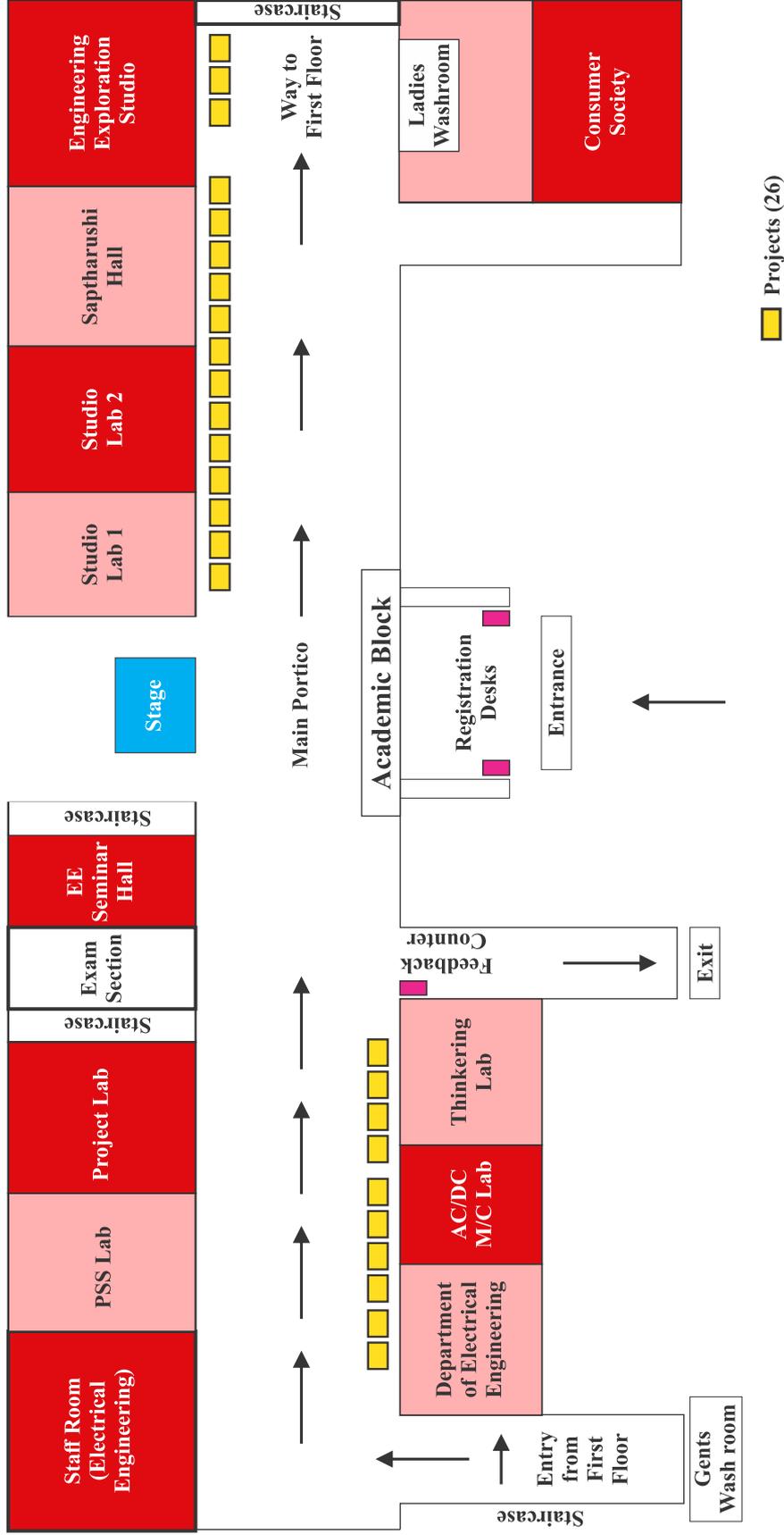


**Prayog Shishir 24  
Layout - First Floor**





### Prayog Shishir 24 Layout - Ground Floor





# PRAYOG

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