STEM LABS
Robotics, Electronics & Engineering

Hands-On STEM Learning for Grades 6–10
Explore • Build • Innovate

Preface

In today's rapidly evolving world, education must prepare students not only to understand technology but also to create it. STEM education—integrating Science, Technology, Engineering, and Mathematics—encourages students to explore ideas, experiment with solutions, and develop the skills needed for innovation.

By engaging with real-world challenges and practical projects, students gain a deeper understanding of how scientific and technological concepts shape the modern world.

The **STEM LABS** program has been developed to introduce students to robotics, electronics, and mechanical engineering through hands-on learning experiences. This book provides a structured pathway for students to explore these fields by building practical projects, experimenting with sensors and circuits, and understanding mechanical systems. Each project is carefully designed to promote curiosity, creativity, and critical thinking while helping students connect theoretical knowledge with practical application.

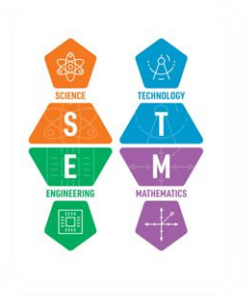
Through this learning journey, students will not only gain technical knowledge but also develop essential 21st-century skills such as problem-solving, collaboration, and innovation. The activities and projects in this book encourage learners to ask questions, test ideas, and build solutions that address real-world needs.

It is our hope that this book inspires young minds to explore technology with confidence and become the innovators, engineers, and leaders of the future.

Table of Contents

S/No	Project Name	Page No
1	Blinking LED	
2	Automatic Street Light	
3	Dancing Robot	
4	Smart Dustbin	
5	Soil Moisture Detection	
6	Spectacles Model	
7	Glow Meter	
8	Music Piano	
9	Hanger Hub	
10	Smart Parking System	
11	Blind Man Stick	
12	Swift Roller	
13	Smoke Detection	
14	Theft Alarm	
15	Fork Lift	
16	Panic Alert System	
17	Automatic Hand Wash System	
18	Giant Wheel	
19	Obstacle Avoidance Car	
20	Radar System	
21	Wind Mill	
22	Snake Game using Dot matrix	
23	Smart Irrigation System	
24	Gear It Ups	
25	3D printer	
26	Drone	
27	3D Pen	

Chapter 1: INTRODUCTION TO STEM



STEM stands for **Science, Technology, Engineering, and Mathematics**. It is an approach to learning that combines these four subjects to help students understand how the world works and how technology is created. STEM education focuses on learning through practical activities, experiments, and real-world problem solving.

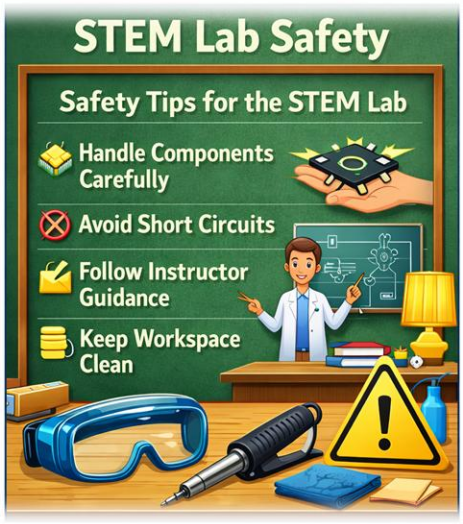
Science helps us understand natural phenomena such as electricity, energy, motion, and materials. **Technology** refers to the tools and devices created by humans, such as computers, robots, and smart machines. **Engineering** involves designing and building systems or structures to solve problems. **Mathematics** provides the calculations and logical thinking required to design and analyze these systems.

By learning STEM, students develop important skills like **critical thinking, creativity, teamwork, and problem-solving**. These skills are essential for modern careers in areas such as robotics, artificial intelligence, electronics, space technology, and renewable energy.

In this book, students will explore STEM concepts through hands-on projects involving **electronics, robotics, and mechanical models**. These activities will help learners understand how ideas are transformed into real working technologies.

Chapter 2 STEM LAB SAFETY

- Safety is very important while working in a STEM laboratory. Students should follow proper safety rules when handling electronic components, tools, and equipment. Following these rules helps prevent accidents and ensures that experiments are performed safely and successfully.
- • **Handle electronic components carefully.** Small components such as sensors, wires, and circuit boards can be delicate and should be handled gently.
  • **Avoid short circuits.** Incorrect connections may cause overheating or damage to electronic devices. Always check the wiring before turning on power.
  • **Follow instructor guidance.** Always listen to the teacher or instructor while performing experiments and building projects.
  • **Keep the workspace clean and organized.** A clean workspace helps prevent mistakes and makes it easier to work safely with tools and components.
- By following these safety rules, students can enjoy learning and experimenting in the STEM lab while protecting themselves and the equipment.



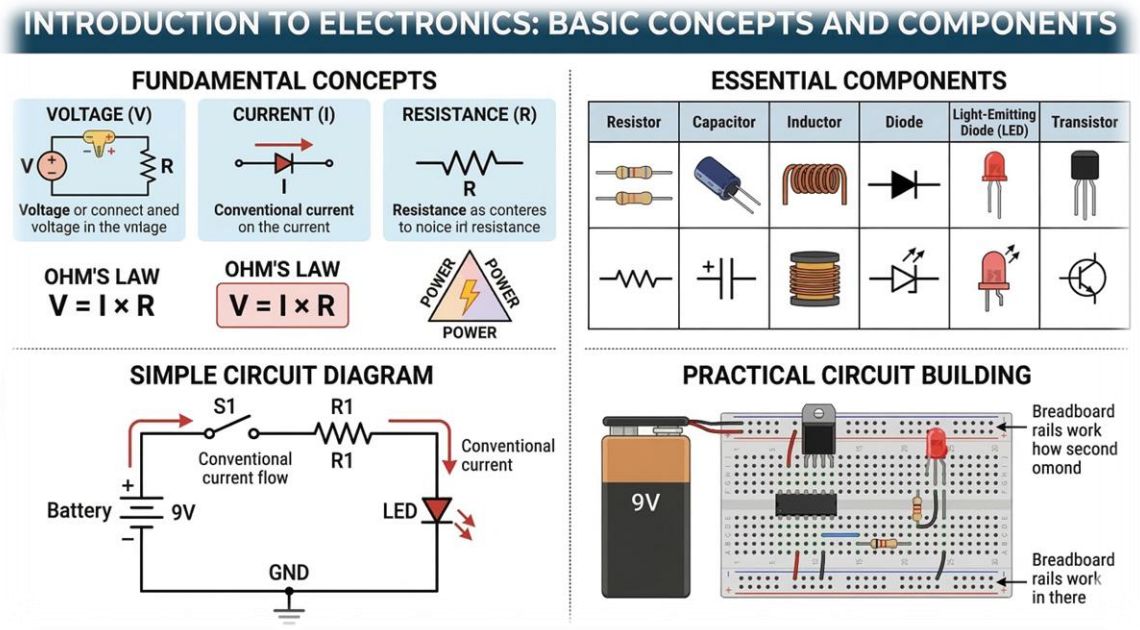
Chapter 3 BASIC ELECTRONICS

Basic electronics explains how different electronic components work together in a circuit to perform useful tasks. These components control the flow of electricity and help create devices such as lights, alarms, robots, and smart systems.

Some common electronic components used in STEM projects include **LEDs, resistors, sensors, buzzers, motors, and batteries**. An **LED (Light Emitting Diode)** produces light when electric current flows through it. A **resistor** is used to control or limit the flow of current in a circuit. **Sensors** detect changes in the environment such as light, distance, temperature, or motion.

In electronic circuits, these components are connected using **wires and breadboards** to create a complete path for electricity to flow. When the circuit is complete, the components work together to produce a specific output such as light, sound, or movement.

Understanding basic electronics is important for building projects in **robotics, automation, and smart technology**, which students will explore throughout this book.



Chapter 4: Introduction to Arduino

• **Arduino** is a small electronic board used to build smart projects and devices.
• It helps us control lights, sensors, motors, and other electronic components using simple programs.
• Arduino is widely used in **robotics, automation, and electronics projects**.
• To use Arduino, we write programs on a computer using a software called the **Arduino IDE**.
• The program is then uploaded to the Arduino board using a **USB cable**.
• The Arduino board reads information from sensors and sends signals to control devices like LEDs, buzzers, or motors.

Types of Arduino Boards

• **Arduino Uno** – The most commonly used Arduino board. It is easy to use and best for beginners and simple electronics projects.

• **Arduino Nano** – A small and compact version of Arduino. It works like the Uno but is used in projects where space is limited.

• **Arduino Mega** – A larger Arduino board with more pins. It is used for advanced projects that need many sensors or components.

Pins in Arduino Boards

Pins are used to connect electronic components to the Arduino board.

• **Digital Pins** – Used for ON/OFF signals. These pins control components like LEDs, buzzers, and relays.

• **Analog Pins** – Used to read sensor values such as light, temperature, or moisture levels.

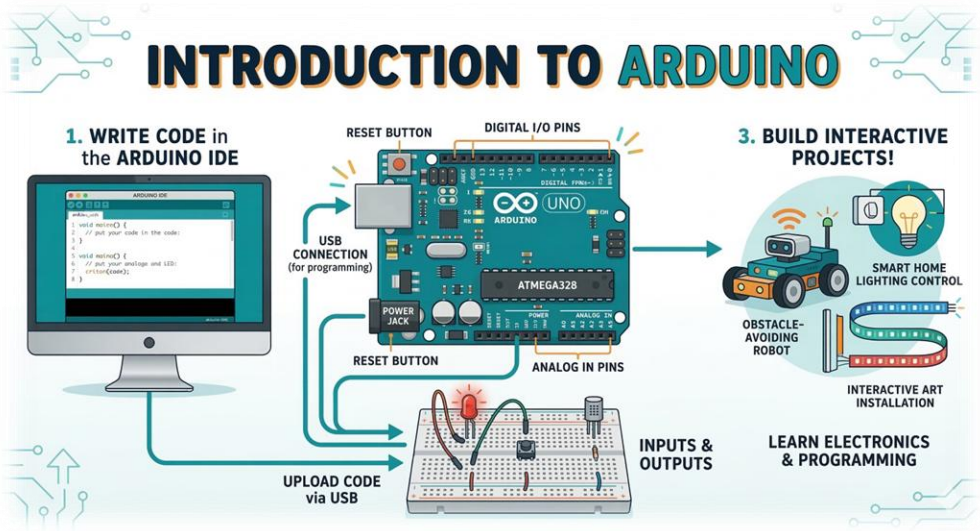
• **Power Pins** – Used to provide power to sensors and other electronic components.

• **Ground (GND) Pins** – Used to complete the electrical circuit.

Difference Between Arduino Uno, Nano, and Mega

Feature	Arduino Uno	Arduino Nano	Arduino Mega
Size	Medium	Small	Large
Digital Pins	14	14	54
Analog Pins	6	8	16
Best Use	Beginner projects	Small compact projects	Large and complex projects
Popular For	Learning Arduino	Small robots and devices	Advanced robotics and automation

All these Arduino boards use a similar programming method, but they differ mainly in **size and number of pins available for connecting components**.



Project 1: Blinking LED

Learning Objectives

• Understand engineering concepts
• Build and test a working model
• Learn practical STEM applications

Introduction

This project introduces the concept of blinking led through practical construction and experimentation. Students observe how technology can solve real world problems.

Components Required

- Arduino / Blix kit parts
- Sensors or mechanical parts
- Breadboard
- Jumper wires
- Power supply

Circuit / Assembly Diagram

Step-by-Step Procedure

1. Collect required components.
2. Assemble circuit or mechanical structure.
3. Verify all connections.
4. Upload program if electronics project.
5. Test the system and observe output.

Working Principle

The system operates using sensors, electronics circuits or mechanical motion to produce the desired output. Students should analyze how inputs are converted into outputs.

Real Life Applications

- Robotics systems
- Automation technology
- Smart devices used in everyday life

Student Questions

6. What is the purpose of this project?
7. Which components are most important?
8. How can this system be improved?

Project 2: Automatic Street Light

Learning Objectives

• Understand engineering concepts
• Build and test a working model
• Learn practical STEM applications

Introduction

This project introduces the concept of automatic street light through practical construction and experimentation. Students observe how technology can solve real world problems.

Components Required

- Arduino / Blix kit parts
- Sensors or mechanical parts
- Breadboard
- Jumper wires
- Power supply

Circuit / Assembly Diagram

Step-by-Step Procedure

9. Collect required components.
10. Assemble circuit or mechanical structure.
11. Verify all connections.
12. Upload program if electronics project.
13. Test the system and observe output.

Working Principle

The system operates using sensors, electronics circuits or mechanical motion to produce the desired output. Students should analyze how inputs are converted into outputs.

Real Life Applications

- Robotics systems
- Automation technology
- Smart devices used in everyday life

Student Questions

14. What is the purpose of this project?
15. Which components are most important?
16. How can this system be improved?

Project 3: Dancing Robot

Learning Objectives

• Understand engineering concepts
• Build and test a working model
• Learn practical STEM applications

Introduction

This project introduces the concept of dancing robot through practical construction and experimentation. Students observe how technology can solve real world problems.

Components Required

- Arduino / Blix kit parts
- Sensors or mechanical parts
- Breadboard
- Jumper wires
- Power supply

Circuit / Assembly Diagram

Step-by-Step Procedure

17. Collect required components.
18. Assemble circuit or mechanical structure.
19. Verify all connections.
20. Upload program if electronics project.
21. Test the system and observe output.

Working Principle

The system operates using sensors, electronics circuits or mechanical motion to produce the desired output. Students should analyze how inputs are converted into outputs.

Real Life Applications

- Robotics systems
- Automation technology
- Smart devices used in everyday life

Student Questions

22. What is the purpose of this project?
23. Which components are most important?
24. How can this system be improved?

Project 4: Smart Dustbin

Learning Objectives

• Understand engineering concepts
• Build and test a working model
• Learn practical STEM applications

Introduction

This project introduces the concept of smart dustbin through practical construction and experimentation. Students observe how technology can solve real world problems.

Components Required

- Arduino / Blix kit parts
- Sensors or mechanical parts
- Breadboard
- Jumper wires
- Power supply

Circuit / Assembly Diagram

Step-by-Step Procedure

25. Collect required components.
26. Assemble circuit or mechanical structure.
27. Verify all connections.
28. Upload program if electronics project.
29. Test the system and observe output.

Working Principle

The system operates using sensors, electronics circuits or mechanical motion to produce the desired output. Students should analyze how inputs are converted into outputs.

Real Life Applications

- Robotics systems
- Automation technology
- Smart devices used in everyday life

Student Questions

30. What is the purpose of this project?
31. Which components are most important?
32. How can this system be improved?

Project 5: Soil Moisture Detection

Learning Objectives

• Understand engineering concepts
• Build and test a working model
• Learn practical STEM applications

Introduction

This project introduces the concept of soil moisture detection through practical construction and experimentation. Students observe how technology can solve real world problems.

Components Required

- Arduino / Blix kit parts
- Sensors or mechanical parts
- Breadboard
- Jumper wires

Circuit / Assembly Diagram

Step-by-Step Procedure

33. Collect required components.
34. Assemble circuit or mechanical structure.
35. Verify all connections.
36. Upload program if electronics project.
37. Test the system and observe output.

Working Principle

The system operates using sensors, electronics circuits or mechanical motion to produce the desired output. Students should analyze how inputs are converted into outputs.

Real Life Applications

- Robotics systems
- Automation technology
- Smart devices used in everyday life

Student Questions

38. What is the purpose of this project?
39. Which components are most important?
40. How can this system be improved?

Project 6: Spectacles Model

Learning Objectives

• Understand engineering concepts
• Build and test a working model
• Learn practical STEM applications

Introduction

This project introduces the concept of spectacles model through practical construction and experimentation. Students observe how technology can solve real world problems.

Components Required

- Arduino / Blix kit parts
- Sensors or mechanical parts
- Breadboard
- Jumper wires
- Power supply

Circuit / Assembly Diagram

Step-by-Step Procedure

41. Collect required components.
42. Assemble circuit or mechanical structure.
43. Verify all connections.
44. Upload program if electronics project.
45. Test the system and observe output.

Working Principle

The system operates using sensors, electronics circuits or mechanical motion to produce the desired output. Students should analyze how inputs are converted into outputs.

Real Life Applications

- Robotics systems
- Automation technology
- Smart devices used in everyday life

Student Questions

46. What is the purpose of this project?
47. Which components are most important?
48. How can this system be improved?

Project 7: Glow Meter

Learning Objectives

• Understand engineering concepts
• Build and test a working model
• Learn practical STEM applications

Introduction

This project introduces the concept of glow meter through practical construction and experimentation. Students observe how technology can solve real world problems.

Components Required

- Arduino / Blix kit parts
- Sensors or mechanical parts
- Breadboard
- Jumper wires
- Power supply

Circuit / Assembly Diagram

Step-by-Step Procedure

49. Collect required components.
50. Assemble circuit or mechanical structure.
51. Verify all connections.
52. Upload program if electronics project.
53. Test the system and observe output.

Working Principle

The system operates using sensors, electronics circuits or mechanical motion to produce the desired output. Students should analyze how inputs are converted into outputs.

Real Life Applications

- Robotics systems
- Automation technology
- Smart devices used in everyday life

Student Questions

54. What is the purpose of this project?
55. Which components are most important?
56. How can this system be improved?

Project 8: Music Piano

Learning Objectives

• Understand engineering concepts
• Build and test a working model
• Learn practical STEM applications

Introduction

This project introduces the concept of music piano through practical construction and experimentation. Students observe how technology can solve real world problems.

Components Required

- Arduino / Blix kit parts
- Sensors or mechanical parts
- Breadboard
- Jumper wires
- Power supply

Circuit / Assembly Diagram

Step-by-Step Procedure

57. Collect required components.
58. Assemble circuit or mechanical structure.
59. Verify all connections.
60. Upload program if electronics project.
61. Test the system and observe output.

Working Principle

The system operates using sensors, electronics circuits or mechanical motion to produce the desired output. Students should analyze how inputs are converted into outputs.

Real Life Applications

- Robotics systems
- Automation technology
- Smart devices used in everyday life

Student Questions

62. What is the purpose of this project?
63. Which components are most important?
64. How can this system be improved?

Project 9: Hanger Hub

Learning Objectives

• Understand engineering concepts
• Build and test a working model
• Learn practical STEM applications

Introduction

This project introduces the concept of hanger hub through practical construction and experimentation. Students observe how technology can solve real world problems.

Components Required

- Arduino / Blix kit parts
- Sensors or mechanical parts
- Breadboard
- Jumper wires
- Power supply

Circuit / Assembly Diagram

Step-by-Step Procedure

65. Collect required components.
66. Assemble circuit or mechanical structure.
67. Verify all connections.
68. Upload program if electronics project.
69. Test the system and observe output.

Working Principle

The system operates using sensors, electronics circuits or mechanical motion to produce the desired output. Students should analyze how inputs are converted into outputs.

Real Life Applications

- Robotics systems
- Automation technology
- Smart devices used in everyday life

Student Questions

70. What is the purpose of this project?
71. Which components are most important?
72. How can this system be improved?

Project 10: Smart Parking System

Learning Objectives

• Understand engineering concepts
• Build and test a working model
• Learn practical STEM applications

Introduction

This project introduces the concept of smart parking system through practical construction and experimentation. Students observe how technology can solve real world problems.

Components Required

- Arduino / Blix kit parts
- Sensors or mechanical parts
- Breadboard
- Jumper wires
- Power supply

Circuit / Assembly Diagram

Step-by-Step Procedure

73. Collect required components.
74. Assemble circuit or mechanical structure.
75. Verify all connections.
76. Upload program if electronics project.
77. Test the system and observe output.

Working Principle

The system operates using sensors, electronics circuits or mechanical motion to produce the desired output. Students should analyze how inputs are converted into outputs.

Real Life Applications

- Robotics systems
- Automation technology
- Smart devices used in everyday life

Student Questions

78. What is the purpose of this project?
79. Which components are most important?
80. How can this system be improved?

Project 11: Blind Man Stick

Learning Objectives

• Understand engineering concepts
• Build and test a working model
• Learn practical STEM applications

Introduction

This project introduces the concept of blind man stick through practical construction and experimentation. Students observe how technology can solve real world problems.

Components Required

- Arduino / Blix kit parts
- Sensors or mechanical parts
- Breadboard
- Jumper wires
- Power supply

Circuit / Assembly Diagram

Step-by-Step Procedure

81. Collect required components.
82. Assemble circuit or mechanical structure.
83. Verify all connections.
84. Upload program if electronics project.
85. Test the system and observe output.

Working Principle

The system operates using sensors, electronics circuits or mechanical motion to produce the desired output. Students should analyze how inputs are converted into outputs.

Real Life Applications

- Robotics systems
- Automation technology
- Smart devices used in everyday life

Student Questions

86. What is the purpose of this project?
87. Which components are most important?
88. How can this system be improved?

Project 12: Swift Roller

Learning Objectives

• Understand engineering concepts
• Build and test a working model
• Learn practical STEM applications

Introduction

This project introduces the concept of swift roller through practical construction and experimentation. Students observe how technology can solve real world problems.

Components Required

- Arduino / Blix kit parts
- Sensors or mechanical parts
- Breadboard
- Jumper wires
- Power supply

Circuit / Assembly Diagram

Step-by-Step Procedure

89. Collect required components.
90. Assemble circuit or mechanical structure.
91. Verify all connections.
92. Upload program if electronics project.
93. Test the system and observe output.

Working Principle

The system operates using sensors, electronics circuits or mechanical motion to produce the desired output. Students should analyze how inputs are converted into outputs.

Real Life Applications

- Robotics systems
- Automation technology
- Smart devices used in everyday life

Student Questions

94. What is the purpose of this project?
95. Which components are most important?
96. How can this system be improved?

Project 13: Smoke Detection

Learning Objectives

• Understand engineering concepts
• Build and test a working model
• Learn practical STEM applications

Introduction

This project introduces the concept of smoke detection through practical construction and experimentation. Students observe how technology can solve real world problems.

Components Required

- Arduino / Blix kit parts
- Sensors or mechanical parts
- Breadboard
- Jumper wires
- Power supply

Circuit / Assembly Diagram

Step-by-Step Procedure

97. Collect required components.
98. Assemble circuit or mechanical structure.
99. Verify all connections.
100. Upload program if electronics project.
101. Test the system and observe output.

Working Principle

The system operates using sensors, electronics circuits or mechanical motion to produce the desired output. Students should analyze how inputs are converted into outputs.

Real Life Applications

- Robotics systems
- Automation technology
- Smart devices used in everyday life

Student Questions

102. What is the purpose of this project?
103. Which components are most important?
104. How can this system be improved?

Project 14: Theft Alarm

Learning Objectives

• Understand engineering concepts
• Build and test a working model
• Learn practical STEM applications

Introduction

This project introduces the concept of theft alarm through practical construction and experimentation. Students observe how technology can solve real world problems.

Components Required

- Arduino / Blix kit parts
- Sensors or mechanical parts
- Breadboard
- Jumper wires
- Power supply

Circuit / Assembly Diagram

Step-by-Step Procedure

105. Collect required components.
106. Assemble circuit or mechanical structure.
107. Verify all connections.
108. Upload program if electronics project.
109. Test the system and observe output.

Working Principle

The system operates using sensors, electronics circuits or mechanical motion to produce the desired output. Students should analyze how inputs are converted into outputs.

Real Life Applications

- Robotics systems
- Automation technology
- Smart devices used in everyday life

Student Questions

110. What is the purpose of this project?
111. Which components are most important?
112. How can this system be improved?

Project 15: Fork Lift

Learning Objectives

• Understand engineering concepts
• Build and test a working model
• Learn practical STEM applications

Introduction

This project introduces the concept of fork lift through practical construction and experimentation. Students observe how technology can solve real world problems.

Components Required

- Arduino / Blix kit parts
- Sensors or mechanical parts
- Breadboard
- Jumper wires
- Power supply

Circuit / Assembly Diagram

Step-by-Step Procedure

113. Collect required components.
114. Assemble circuit or mechanical structure.
115. Verify all connections.
116. Upload program if electronics project.
117. Test the system and observe output.

Working Principle

The system operates using sensors, electronics circuits or mechanical motion to produce the desired output. Students should analyze how inputs are converted into outputs.

Real Life Applications

- Robotics systems
- Automation technology
- Smart devices used in everyday life

Student Questions

118. What is the purpose of this project?
119. Which components are most important?
120. How can this system be improved?

Project 16: Panic Alert System

Learning Objectives

• Understand engineering concepts
• Build and test a working model
• Learn practical STEM applications

Introduction

This project introduces the concept of panic alert system through practical construction and experimentation. Students observe how technology can solve real world problems.

Components Required

- Arduino / Blix kit parts
- Sensors or mechanical parts
- Breadboard
- Jumper wires
- Power supply

Circuit / Assembly Diagram

Step-by-Step Procedure

121. Collect required components.
122. Assemble circuit or mechanical structure.
123. Verify all connections.
124. Upload program if electronics project.
125. Test the system and observe output.

Working Principle

The system operates using sensors, electronics circuits or mechanical motion to produce the desired output. Students should analyze how inputs are converted into outputs.

Real Life Applications

- Robotics systems
- Automation technology
- Smart devices used in everyday life

Student Questions

126. What is the purpose of this project?
127. Which components are most important?
128. How can this system be improved?

Project 17: Automatic Hand Wash

Learning Objectives

• Understand engineering concepts
• Build and test a working model
• Learn practical STEM applications

Introduction

This project introduces the concept of automatic hand wash through practical construction and experimentation. Students observe how technology can solve real world problems.

Components Required

- Arduino / Blix kit parts
- Sensors or mechanical parts
- Breadboard
- Jumper wires
- Power supply

Circuit / Assembly Diagram

Step-by-Step Procedure

129. Collect required components.
130. Assemble circuit or mechanical structure.
131. Verify all connections.
132. Upload program if electronics project.
133. Test the system and observe output.

Working Principle

The system operates using sensors, electronics circuits or mechanical motion to produce the desired output. Students should analyze how inputs are converted into outputs.

Real Life Applications

- Robotics systems
- Automation technology
- Smart devices used in everyday life

Student Questions

134. What is the purpose of this project?
135. Which components are most important?
136. How can this system be improved?

Project 18: Giant Wheel

Learning Objectives

• Understand engineering concepts
• Build and test a working model
• Learn practical STEM applications

Introduction

This project introduces the concept of giant wheel through practical construction and experimentation. Students observe how technology can solve real world problems.

Components Required

- Arduino / Blix kit parts
- Sensors or mechanical parts
- Breadboard
- Jumper wires
- Power supply

Circuit / Assembly Diagram

Step-by-Step Procedure

137. Collect required components.
138. Assemble circuit or mechanical structure.
139. Verify all connections.
140. Upload program if electronics project.
141. Test the system and observe output.

Working Principle

The system operates using sensors, electronics circuits or mechanical motion to produce the desired output. Students should analyze how inputs are converted into outputs.

Real Life Applications

- Robotics systems
- Automation technology
- Smart devices used in everyday life

Student Questions

142. What is the purpose of this project?
143. Which components are most important?
144. How can this system be improved?

Project 19: Obstacle Avoidance Car

Learning Objectives

• Understand engineering concepts
• Build and test a working model
• Learn practical STEM applications

Introduction

This project introduces the concept of obstacle avoidance car through practical construction and experimentation. Students observe how technology can solve real world problems.

Components Required

- Arduino / Blix kit parts
- Sensors or mechanical parts
- Breadboard
- Jumper wires
- Power supply

Circuit / Assembly Diagram

Step-by-Step Procedure

145. Collect required components.
146. Assemble circuit or mechanical structure.
147. Verify all connections.
148. Upload program if electronics project.
149. Test the system and observe output.

Working Principle

The system operates using sensors, electronics circuits or mechanical motion to produce the desired output. Students should analyze how inputs are converted into outputs.

Real Life Applications

- Robotics systems
- Automation technology
- Smart devices used in everyday life

Student Questions

150. What is the purpose of this project?
151. Which components are most important?
152. How can this system be improved?

Project 20: Radar System

Learning Objectives

• Understand engineering concepts
• Build and test a working model
• Learn practical STEM applications

Introduction

This project introduces the concept of radar system through practical construction and experimentation. Students observe how technology can solve real world problems.

Components Required

- Arduino / Blix kit parts
- Sensors or mechanical parts
- Breadboard
- Jumper wires
- Power supply

Circuit / Assembly Diagram

Step-by-Step Procedure

153. Collect required components.
154. Assemble circuit or mechanical structure.
155. Verify all connections.
156. Upload program if electronics project.
157. Test the system and observe output.

Working Principle

The system operates using sensors, electronics circuits or mechanical motion to produce the desired output. Students should analyze how inputs are converted into outputs.

Real Life Applications

- Robotics systems
- Automation technology
- Smart devices used in everyday life

Student Questions

158. What is the purpose of this project?
159. Which components are most important?
160. How can this system be improved?

Project 21: Wind Mill

Learning Objectives

• Understand engineering concepts
• Build and test a working model
• Learn practical STEM applications

Introduction

This project introduces the concept of wind mill through practical construction and experimentation. Students observe how technology can solve real world problems.

Components Required

- Arduino / Blix kit parts
- Sensors or mechanical parts
- Breadboard
- Jumper wires
- Power supply

Circuit / Assembly Diagram

Step-by-Step Procedure

161. Collect required components.
162. Assemble circuit or mechanical structure.
163. Verify all connections.
164. Upload program if electronics project.
165. Test the system and observe output.

Working Principle

The system operates using sensors, electronics circuits or mechanical motion to produce the desired output. Students should analyze how inputs are converted into outputs.

Real Life Applications

- Robotics systems
- Automation technology
- Smart devices used in everyday life

Student Questions

166. What is the purpose of this project?
167. Which components are most important?
168. How can this system be improved?

Project 22: Snake Game

Learning Objectives

• Understand engineering concepts
• Build and test a working model
• Learn practical STEM applications

Introduction

This project introduces the concept of snake game through practical construction and experimentation. Students observe how technology can solve real world problems.

Components Required

- Arduino / Blix kit parts
- Sensors or mechanical parts
- Breadboard
- Jumper wires
- Power supply

Circuit / Assembly Diagram

Step-by-Step Procedure

169. Collect required components.
170. Assemble circuit or mechanical structure.
171. Verify all connections.
172. Upload program if electronics project.
173. Test the system and observe output.

Working Principle

The system operates using sensors, electronics circuits or mechanical motion to produce the desired output. Students should analyze how inputs are converted into outputs.

Real Life Applications

- Robotics systems
- Automation technology
- Smart devices used in everyday life

Student Questions

174. What is the purpose of this project?
175. Which components are most important?
176. How can this system be improved?

Project 23: Smart Irrigation

Learning Objectives

• Understand engineering concepts
• Build and test a working model
• Learn practical STEM applications

Introduction

This project introduces the concept of smart irrigation through practical construction and experimentation. Students observe how technology can solve real world problems.

Components Required

- Arduino / Blix kit parts
- Sensors or mechanical parts
- Breadboard
- Jumper wires
- Power supply

Circuit / Assembly Diagram

Step-by-Step Procedure

177. Collect required components.
178. Assemble circuit or mechanical structure.
179. Verify all connections.
180. Upload program if electronics project.
181. Test the system and observe output.

Working Principle

The system operates using sensors, electronics circuits or mechanical motion to produce the desired output. Students should analyze how inputs are converted into outputs.

Real Life Applications

- Robotics systems
- Automation technology
- Smart devices used in everyday life

Student Questions

182. What is the purpose of this project?
183. Which components are most important?
184. How can this system be improved?

Project 24: Gear It Ups

Learning Objectives

• Understand engineering concepts
• Build and test a working model
• Learn practical STEM applications

Introduction

This project introduces the concept of gear it ups through practical construction and experimentation. Students observe how technology can solve real world problems.

Components Required

- Arduino / Blix kit parts
- Sensors or mechanical parts
- Breadboard
- Jumper wires
- Power supply

Circuit / Assembly Diagram

Step-by-Step Procedure

185. Collect required components.
186. Assemble circuit or mechanical structure.
187. Verify all connections.
188. Upload program if electronics project.
189. Test the system and observe output.

Working Principle

The system operates using sensors, electronics circuits or mechanical motion to produce the desired output. Students should analyze how inputs are converted into outputs.

Real Life Applications

- Robotics systems
- Automation technology
- Smart devices used in everyday life

Student Questions

190. What is the purpose of this project?
191. Which components are most important?
192. How can this system be improved?

Project 25: 3D Printer

Learning Objectives

• Understand engineering concepts
• Build and test a working model
• Learn practical STEM applications

Introduction

This project introduces students to 3D printing technology. Students learn how digital designs are converted into physical objects using additive manufacturing techniques.

Components Required

• Arduino / Kit parts
• Sensors or mechanical parts
• Breadboard
• Jumper wires
• Power supply

Circuit / Assembly Diagram

Working Principle

The system operates using sensors, electronics circuits or mechanical motion to produce the desired output. Students should analyze how inputs are converted into outputs.

Real Life Applications

• Robotics systems
• Automation technology
• Smart devices used in everyday life

Student Questions

1. What is the purpose of this project?
2. Which components are most important?
3. How can this system be improved?

Project 26: Drone

Learning Objectives

• Understand engineering concepts
• Build and test a working model
• Learn practical STEM applications

Introduction

This project introduces the basics of drones and flight systems. Students understand how drones are controlled and how they are used in various real-world applications.

Components Required

• Arduino / Kit parts
• Sensors or mechanical parts
• Breadboard
• Jumper wires
• Power supply

Circuit / Assembly Diagram

Step-by-Step Procedure

1. Collect required components.
2. Assemble circuit or mechanical structure.
3. Verify all connections.
4. Upload program if electronics project.
5. Test the system and observe output.

Working Principle

The system operates using sensors, electronics circuits or mechanical motion to produce the desired output. Students should analyze how inputs are converted into outputs.

Real Life Applications

• Robotics systems
• Automation technology
• Smart devices used in everyday life

Student Questions

1. What is the purpose of this project?
2. Which components are most important?
3. How can this system be improved?

Project 27: 3D Pen

Learning Objectives

• Understand engineering concepts
• Build and test a working model
• Learn practical STEM applications

Introduction

This project introduces a 3D pen which allows students to draw objects in three dimensions. It helps develop creativity and understanding of basic design concepts.

Components Required

• Arduino / Kit parts
• Sensors or mechanical parts
• Breadboard
• Jumper wires
• Power supply

Circuit / Assembly Diagram

Step-by-Step Procedure

1. Collect required components.
2. Assemble circuit or mechanical structure.
3. Verify all connections.
4. Upload program if electronics project.
5. Test the system and observe output.

Working Principle

The system operates using sensors, electronics circuits or mechanical motion to produce the desired output. Students should analyze how inputs are converted into outputs.

Real Life Applications

• Robotics systems
• Automation technology
• Smart devices used in everyday life

Student Questions

1. What is the purpose of this project?
2. Which components are most important?
3. How can this system be improved?

Innovation Challenges

Design your own project using the concepts learned in this book.

STEM LABS
Explore • Build • Innovate

STEM LABS
Robotics, Electronics & Engineering

Hands-On STEM Learning for Grades 6–10
Explore • Build • Innovate