

JUNIOR

TEAM NAME : ROBORANGMANCH

TEAM NUMBER : 1324



COUNTRY INDIA



Caption

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ROBORANGMANCH

Bringing Stories to Life Through Robotics

1. TEAM INTRODUCTION AND ROLES

We are Team RoboRangManch, a group of young innovators who believe that robotics can do more than automate tasks—it can help people connect with stories, culture, and history. The WRO 2026 theme, "Robots Meet Culture", inspired us to explore how technology can transform the way people experience important cultural and historical narratives.

Tvisha Shah , Grade 8, Jamnabai Narsee School

Tvisha is participating in WRO for the second time. She led the historical research, helped develop the storyline, supported programming, and contributed to the presentation design.

Ishaan Bubna , Grade 8, Jamnabai Narsee School

Ishaan focused on mechanical design, robot construction, and testing. He played a key role in developing the automated stage mechanisms and improving their reliability.

Ridhaan Agarwal Grade 9, NIOS

Ridhaan is a specially abled student on the spectrum. He is responsible for operating and controlling the stage performance. His precision and focus help synchronize the different robotic systems during demonstrations.



RIDHAAN , TVSIHA AND ISHAAN (LEFT TO RIGHT)

2.EXECUTIVE SUMMARY

Many important cultural and historical stories become less visible to younger generations over time. While textbooks and videos provide information, they often do not create the engagement and emotional connection needed for deeper understanding.

Initially, our team planned to create a robotic theatre based on the Ramayana. However, after research and discussion, we realized that many well-known stories are already represented through books, films, and theatre.

We therefore asked ourselves:

"Can robotics help people discover inspiring stories that are not always in the spotlight?" This question led us to the story of Savitribai Phule and Jyotirao Phule, pioneers of education and social reform in India. To bring their story to life, we created RoboRangManch, an automated robotic theatre that combines LEGO robotics, storytelling, stage automation, and future AI interaction.

The system uses:

- Rotating stage backdrops
- Motorized character introduction systems
- Dual conveyor crowd movement mechanisms
- Automated scissor lifts
- Coordinated programming

Together, these mechanisms create an immersive storytelling experience where audiences can watch history unfold through robotic movement.

The value of RoboRangManch extends beyond this single story. The platform can be adapted for museums, schools, cultural exhibitions, and educational centres to present many different historical and cultural narratives.

3. PRESENTATION OF THE ROBOTIC SOLUTION

3.1 EVOLUTION OF THE IDEA

The journey of RoboRangManch began with a simple question:

“How can robots help people experience culture rather than simply observe it?”

Our first concept was a robotic theatre based on the Ramayana. While researching this idea, we realized that many famous cultural stories are already represented through books, films, television shows, and stage performances.

We wanted to explore whether robotics could help bring attention to inspiring stories that are less frequently presented to young audiences.

This led us to investigate social reformers, educators, and historical figures who changed society through courage and determination.

After extensive research, we selected the story of Savitribai Phule and Jyotirao Phule because their work in education, equality, and social reform



STUDENTS CREATING THEIR
ROTATING SCENE ROBOTIC
SOLUTION



continues to influence society today.

The project evolved from a simple robotic stage into a cultural storytelling platform that combines robotics, engineering, education, and future AI interaction.

3.2 RESEARCH AND INSPIRATION

Before building our solution, we researched several areas to understand how culture and technology could work together.

Research Areas

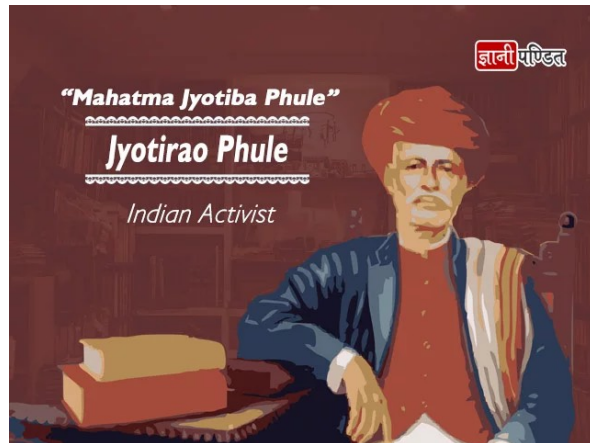
- Traditional theatre productions
- Puppet storytelling systems
- Museum exhibits and cultural installations
- Historical reenactments
- Interactive science centre exhibits
- Educational learning platforms
- Projection mapping technologies
- AI-powered museum guides
- Storytelling through robotics

Key Findings

- Audiences learn better when stories include movement and interaction.
- Visual storytelling improves engagement and memory retention.
- Museums increasingly use technology to create immersive experiences.
- Robotics can transform passive learning into active learning.

We also researched the lives of Savitribai and Jyotirao Phule to ensure historical accuracy in our storytelling.

This research helped us identify an opportunity to create an educational platform that combines culture, history, and robotics.



3.3 ALTERNATIVE CONCEPTS EXPLORED

Before finalizing RoboRangManch, we explored several different ideas.

Concept 1 – Ramayana Theatre

Advantages:

- Strong cultural connection
- Familiar storyline

Limitations:

- Already widely represented
- Limited originality

Concept 2 – Interactive Cultural Quiz Booth

Advantages:

- Educational
- Easy to implement

Limitations:

- Low audience engagement

Concept 3 – AI Museum Guide

Advantages:

- Interactive learning

Limitations:

- Limited visual storytelling

Concept 4 – Robotic Storytelling Stage

Advantages:

- Combines engineering and culture
- Creates immersive experiences
- Supports multiple future stories
- Encourages audience engagement

After comparing all concepts, we selected the robotic storytelling stage because it provided the strongest combination of education, innovation, culture, and engineering.

3.4 WHY SAVITRIBAI PHULE?

While researching historical figures, we discovered the inspiring story of Savitribai Phule and Jyotirao Phule.

Savitribai Phule is widely recognized as one of India's first female teachers and a pioneer of girls' education.

Together, they worked to:

- Improve access to education
- Promote equality
- Challenge social barriers
- Create opportunities for future generations

We selected this story because it reflects values that remain important today.

The story also aligns with our vision of using technology to educate, inspire, and create meaningful discussions.

By presenting this story through robotics, we hope to encourage audiences to learn more about the people who helped shape modern India.



3.5 OVERALL SYSTEM ARCHITECTURE

RoboRangManch consists of four major robotic subsystems working together to create a synchronized theatrical experience.

Subsystems

1. Rotating Background System
2. Character Extension Mechanism
3. Dual Conveyor Crowd Movement System
4. Scissor Lift Character System

Platforms Used

- LEGO SPIKE Prime ,LEGO EV3
Mindstorms , QUARKY

Each mechanism performs a specific role in the storytelling process while remaining synchronised with the overall performance.

System Flow

Story Sequence

↓

Program Execution

↓

Background Rotation

↓

Character Introduction

↓

Crowd Movement

↓

Scissor Lift Presentation

↓

Audience Experience

The modular architecture allows future stories to be added without redesigning the entire platform.



Caption



3.6 ROTATING BACKGROUND SYSTEM

Platform: LEGO SPIKE Prime

The rotating backdrop mechanism is responsible for changing scenes throughout the performance. The system uses two SPIKE Prime motors connected to a rotating structure that displays different scenes from Savitribai Phule's life.

Engineering Features

- ONE SPIKE Prime motor ,Rotating scene platform
- Position-controlled movement , Repeatable scene alignment

Challenges

- Accurate positioning , Preventing over-rotation
- Maintaining structural stability

Solutions

- Adjusted motor rotation values , Improved structural supports
- Repeated calibration and testing

The rotating backdrop creates smooth transitions and helps audiences follow the storyline more easily.



3.7 Artificial Intelligence Used in RoboRangManch

Artificial Intelligence played an important role in the research, design, and future development of RoboRangManch. The team explored various AI tools to enhance creativity, improve project documentation, and investigate future interactive storytelling possibilities.

1. ChatGPT – Research and Documentation

ChatGPT was used to assist with project research, report writing, presentation development, technical documentation, SDG mapping, and refinement of ideas. It helped organize information into a professional format suitable for WRO Future Innovators.

2. Google Gemini – Visual Design and Content Generation

Google Gemini was used to generate concept images, improve visual presentation materials, and create references for stage layouts and historical storytelling scenes. This helped the team communicate project ideas more effectively.

3. PictoBlox Machine Learning

The PictoBlox Machine Learning Extension was explored to understand how AI can be integrated into educational robotics. The team investigated sound recognition, voice interaction, and intelligent storytelling features that could be added to future versions of RoboRangManch.

4. Quarky AI Board

Quarky was studied as a future smart control platform for the project. Its AI capabilities, programmable LED system, sensors, and automation features can be used to create interactive storytelling experiences, audience participation, and intelligent scene control.

Future AI Development

For future competitions, the team plans to integrate AI-based voice recognition, automated scene selection, smart LED indicators, and interactive audience engagement. These features will allow RoboRangManch to respond dynamically to users while making cultural storytelling more immersive and educational.

3.8 CONVEYOR CROWD MOVEMENT SYSTEM

To create a more realistic stage environment, we developed a dual-conveyor movement system.

The conveyors represent characters moving through different stages of the story.

Engineering Features

- Two independent EV3 motors
- Dual conveyor architecture
- Adjustable speed control
- Guided roller systems
- Continuous belt mechanisms

Challenges

- Belt slippage
- Character stability
- Timing synchronization

Solutions

- Optimized belt tension
- Redesigned character mounts
- Improved timing controls

This system transforms the stage from a static display into a dynamic storytelling environment.



3.9 Scissor Lift Character System

The scissor lift mechanism was one of the most challenging subsystems to develop. Its purpose is to raise important characters onto the stage during key moments of the performance, making them clearly visible to the audience.

Development Journey

Our first scissor lift prototype was able to lift the platform, but once characters were added, the structure struggled to rise smoothly. The additional weight created resistance, causing the lift to move slowly or stop before reaching the required height.

To overcome this challenge, we went through several design iterations, testing different scissor geometries, support structures, and motor configurations.

Prototype 1

Basic scissor lift design.

Could lift an empty platform.

Struggled when character models were added.

Prototype 2

Added structural reinforcements.

Improved stability.

Still lacked sufficient lifting power.

Prototype 3 (Final Design)

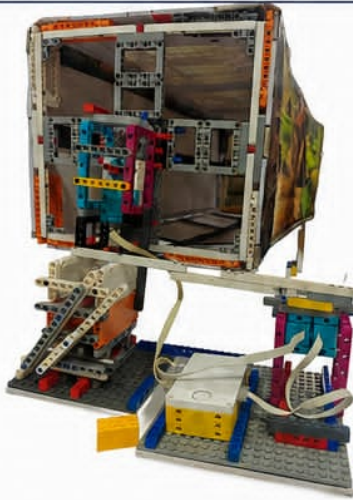
Introduced a gearing system between the EV3 motor and lift mechanism.

Increased torque and lifting capability.

Successfully raised the character platform smoothly and consistently.

Provided better control and repeatability during performances.

Final Features



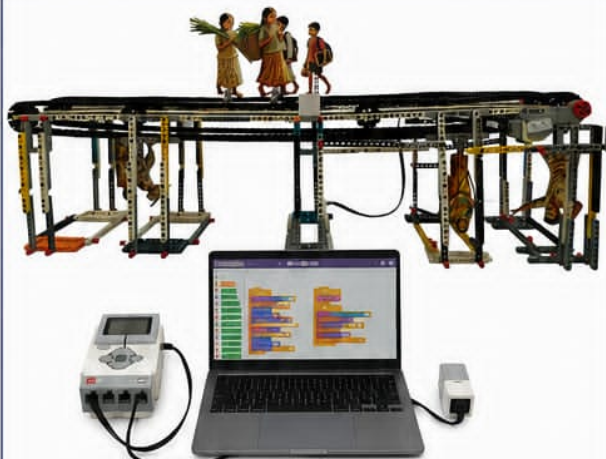
1. 4-WAY SCENE CHANGER (GEAR MECHANISM)

Spike Prime Hub is attached to a gear mechanism that rotates the 4-way panel to change each scene in the backdrop.



2. FLAP RAISING MECHANISM (SCENE PROP)

Spike Prime Hub is connected to a Color Sensor that detects the trigger and raises or lowers the flap/prop for each scene.



3. CONVEYOR BELT ACTIVATION

EV3 Hub is connected to PictoBlox and Quarky via Color Sensor. The sensor detects the signal and activates the EV3 conveyor belt.



4. ROTATING GEAR PROP DELIVERY

EV3 Hub is connected to a motorized rotating gear system that delivers different props up to the scene area automatically.

FLOW CHART 1: CONVEYOR ACTIVATION SYSTEM



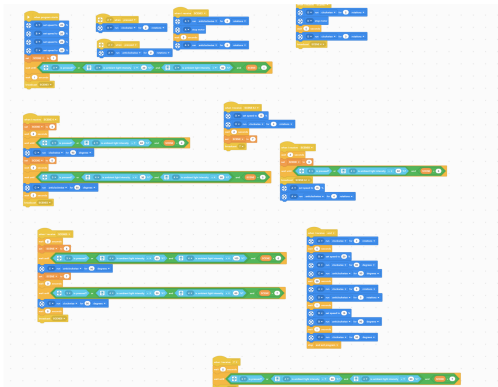
FLOW CHART 2: SCENE CHANGE SYSTEM



ROBORANGMANCH - COMBINED CONTROL CODES

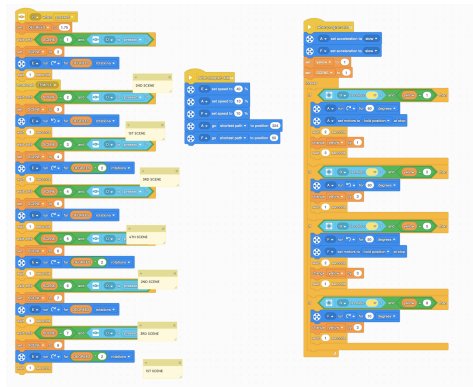
1. EV3 CODE

Scene movement + sensors



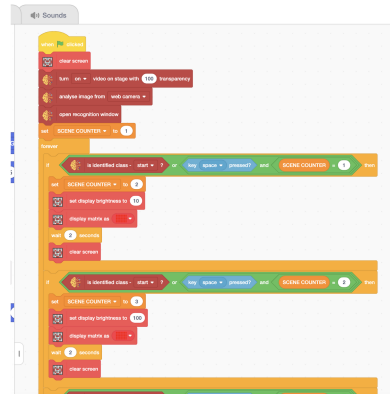
2. SPIKE PRIME CODE

Scene rotation + colour actions



3. PICTOBLOX + QUARKY CODE

AI/voice trigger + scene counter



RoboRangManch control architecture: Pictoblox trigger → SPIKE/EV3 scene mechanisms

3.10 PICTBLOX AI MACHINE LEARNING , EV3 MINDSTORM AND SPIKE PRIME CODING .

4 SOCIAL IMPACT AND INNOVATION

Who Will It Help?

1. School Students

Many students learn about historical figures only through textbooks. RoboRangManch transforms learning into an immersive experience by allowing students to watch historical events unfold through robotic storytelling.

2. Teachers and Schools

RoboRangManch serves as an educational tool that can enhance classroom lessons.

3. Museums and Cultural Centres

Museums are constantly looking for innovative ways to engage younger audiences.

RoboRangManch can create interactive exhibits featuring:

Historical Figures

- Savitribai Phule & Jyotirao Phule
- Dr. B. R. Ambedkar , Mahatma Gandhi , Rani Lakshmibai

Cultural Themes

- Women empowerment. Education reforms. Freedom struggle.
- Scientific innovation. Social equality.

Why Is This Important?

History and culture shape a nation's identity.

While technology is rapidly advancing, many young people are becoming disconnected from the stories of the individuals who transformed society.

Estimated Impact

Schools

- Thousands of students reached annually per school.

Museums

- Thousands of visitors exposed to historical storytelling experiences.

Community Events

- Large audiences during cultural and national celebrations.

Long-Term Impact

4.1 Sustainable Development Goals (SDGs)

SDG 4 – Quality Education

RoboRangManch promotes engaging and experiential learning through robotics and storytelling.

SDG 5 – Gender Equality

The project highlights the achievements of Savitribai Phule and promotes awareness of women's rights and equal educational opportunities.

SDG 9 – Industry, Innovation and Infrastructure

Uses robotics and automation to create innovative educational experiences.

SDG 10 – Reduced Inequalities

Encourages awareness of social reform and inclusion.

SDG 11 – Sustainable Cities and Communities

Helps preserve cultural heritage and historical knowledge.

SDG 17 – Partnerships for the Goals

Promotes collaboration among students, schools, educators, and communities.

Primary SDGs

1. SDG 4 – Quality Education
2. SDG 5 – Gender Equality

3. SDG 9 – Industry, Innovation and Infrastructure
4. SDG 11 – Sustainable Cities and Communities

4.2 Key References and Sources

Robotics and Programming

1. WRO 2026 Future Innovators Guidelines
2. LEGO Education Resources
3. LEGO Mindstorms EV3 Documentation

Historical and Cultural Research

1. [UNESCO Intangible Cultural Heritage](#)
2. [Ministry of Culture, Government of India](#)
3. [National Portal of India – Savitribai Phule Resources](#)
4. [Sangeet Natak Akademi](#)

4.3 Research Activities Conducted

- Studied the life and contributions of Savitribai Phule.
- Researched the history of women's education in India.
- Investigated how storytelling improves learning and cultural awareness.
- Explored the use of robotics in education and museums.
- Studied methods of preserving culture through technology.
- Researched historical timelines and social reform movements in India.
- Analyzed how robotic theatre can make history more engaging for young learners.

4.4 Business Model Canvas – RoboRangManch

Real-World Validation Through Live Public Performances

Live Public Demonstration - Funkaar Studio



To validate the practicality and impact of Robo Rangmanch, our team conducted two live public performances at Funkaar Studio, Andheri West. Members of the public were invited to experience the robotic theatre firsthand, allowing us to evaluate the project in a real-world setting beyond the classroom.

The students independently managed and presented two complete performances from 11:00–11:30 AM and 11:30 AM–12:00 PM, demonstrating the reliability of both the robotic system and the storytelling experience. Throughout the sessions, the audience actively engaged with the performance, observed the automated stage mechanisms,

and interacted with the team by asking questions and sharing feedback.

This public demonstration proved that Robo Rangmanch is not merely a prototype, but a functional educational platform capable of delivering engaging cultural performances to real audiences. The successful execution of multiple

Audience Engagement & Project Validation



consecutive shows demonstrated the system's consistency, ease of operation, and suitability for repeated use in educational and cultural environments.

The project aligns strongly with the WRO 2026 theme, "Robots Meet Culture," by combining robotics, automation, storytelling, and Indian heritage into a single interactive experience. Rather than simply displaying cultural information, Robo Rangmanch uses robotics to recreate historical stories.