



# Childhood Memories

Supervised by: Dr. Suleiman Abu Kharmeh

Fatima Nasser & Lama Dwikat

# The motivation

Most traditional puppet theaters rely on manual movement.

- Hard to repeat the same show with the same quality.
- Needs a person behind the scenes all the time.
- No use of modern technology in puppet theaters.



# Solution



Introduces an automated puppet theater .

to deliver interactive and entertaining shows without direct human control.

# features

## Puppets Movments

### 1. Full Body Movement

- Used NEMA 23 stepper motor with a driver for precise control.
- Applied the lead screw and nut mechanism to convert rotation into linear motion.



# features

## Puppets Movments

### 2. Puppet Movement – Arms and Legs

- Each puppet is controlled by 4 servo motors (one for each arm and one for each leg).
- Servos are connected to the puppet's joints using strings for natural movement.



# features

## Rain Effect Feature

- Used a water pump connected through a relay module for control.
- Water flows through a pierced hose to simulate falling rain.



# features

## Fog Effect Feature

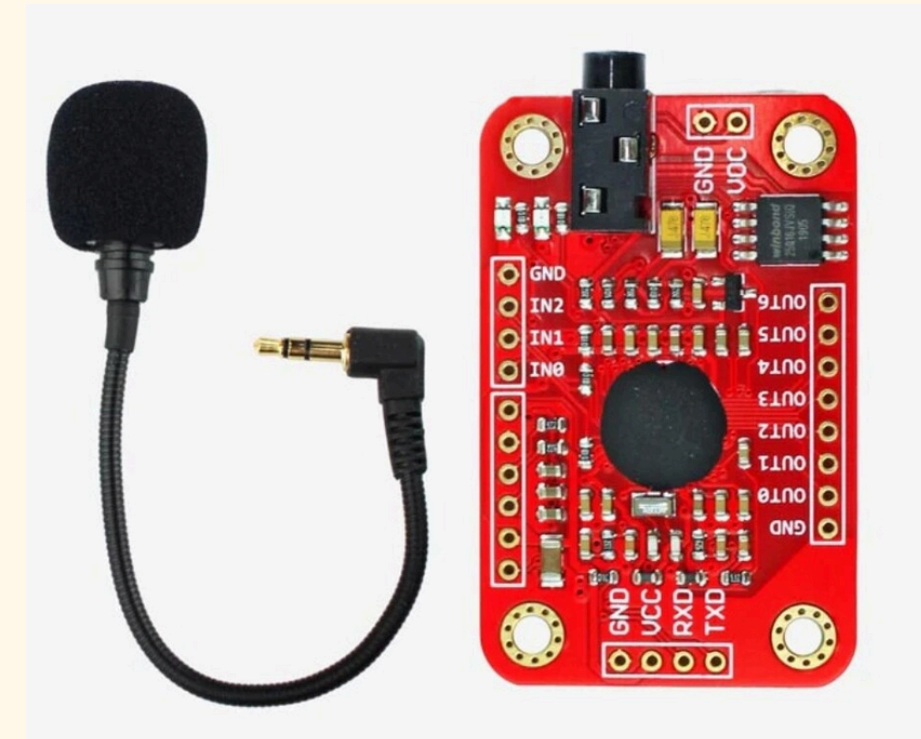
- Used a fog machine powered by a 24V power supply.
- Controlled using a relay module connected to the system.



# features

## Voice recognition

- Recorded a set of voice commands to control puppet actions.  
commands are in arabic & english like  
"Hello" , "How are you?" , "Dance Dabke" , "Jump" , "Tell a joke" , "Sing"  
,"Goodbye" .



# features

## Lighting Feature

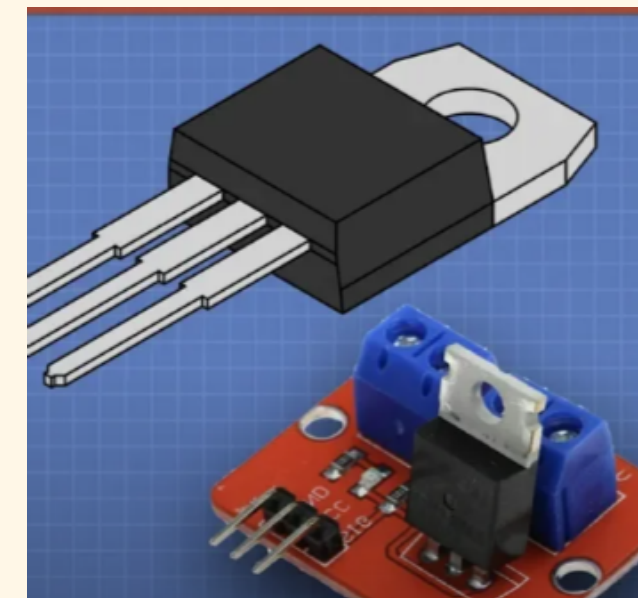
### 1. RGB DCL Lights

- Connected to a relay module for on/off control.
- Used to create lighting during sound effects.



### 2. LED Strip Lights

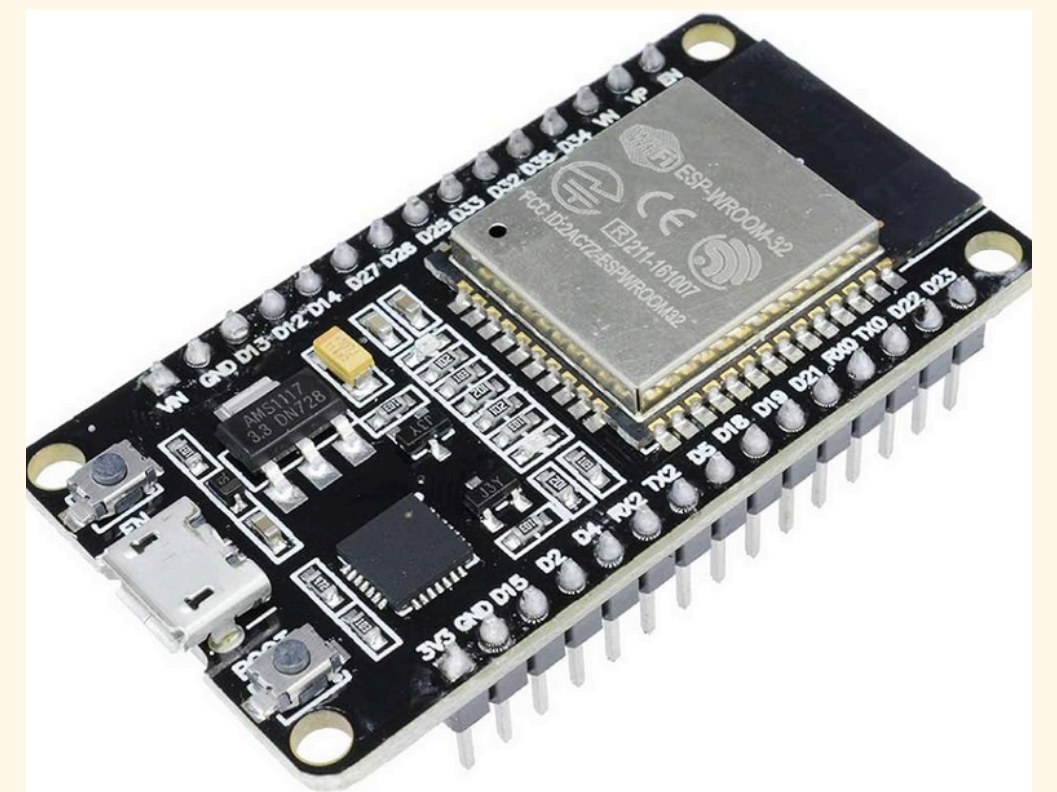
- Controlled using a BJT & MOSFET .
- Provides dynamic and colorful lighting effects across the stage.



# features

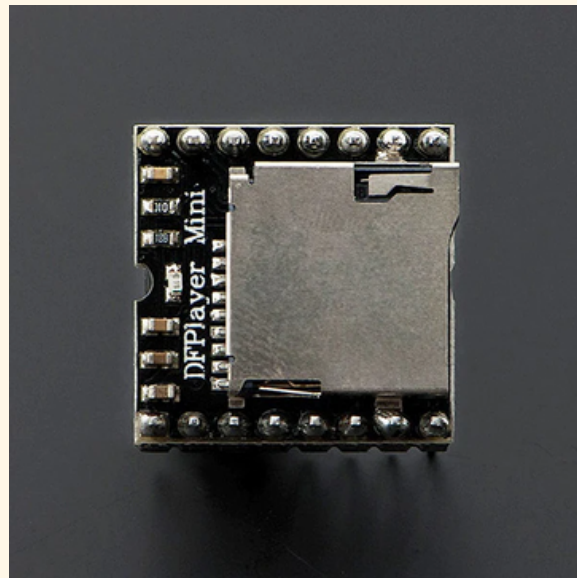
## Web Page Control (ESP32)

- Used an ESP32 module to host a web page.
  - Features include:
    - Control puppet movements
    - Start/stop stories
  - Activate/deactivate voice recognition mode



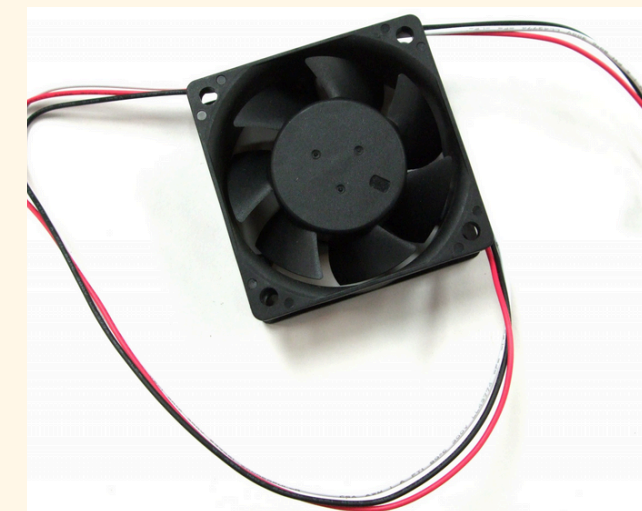
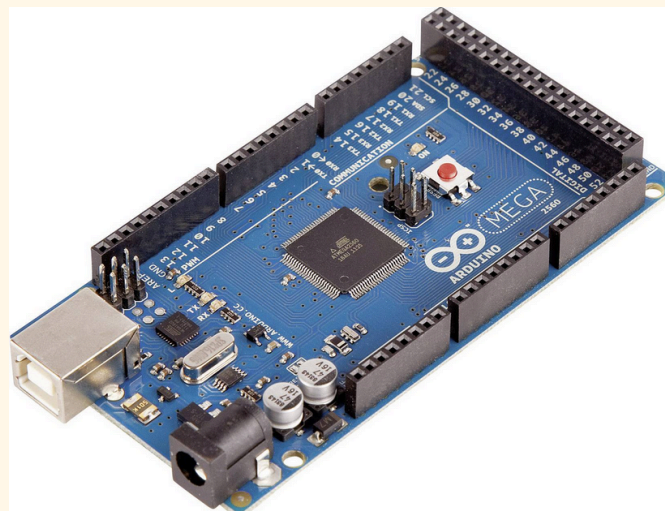
# Audio Output System

- Used SD card & a DFPlayer Mini module to play pre-recorded voices and story audio.



# Additional Components

- Arduino ,Limit Switch , power supply , fan



# Constrats

## Unstable Puppet Movement

- When the puppet moved, the strings would twist and get tangled.
- This caused unbalanced motion and required frequent adjustments.



# Constrats

## Limited Space for Servos

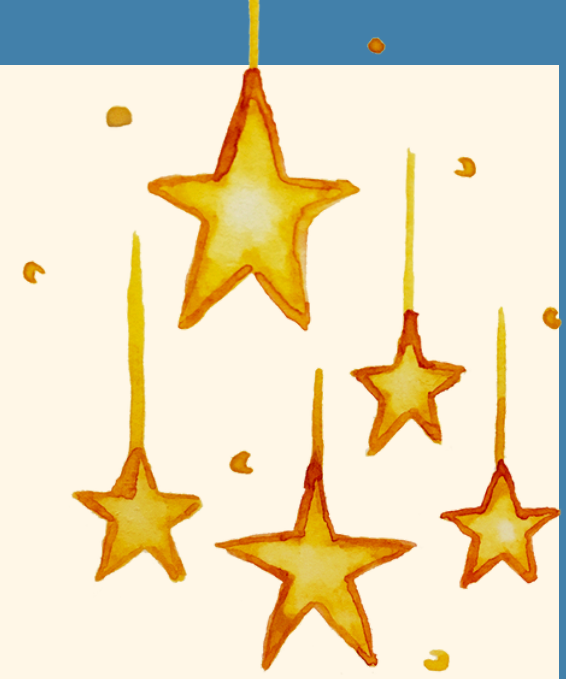
- The wooden bar above the puppets was too small to fit all servos in a straight line.
- To save space and allow maximum movement, servos were mounted upside down and stacked vertically.



# Constrats

## Rain Effect Not Visible

- At first, the falling water didn't look like real rain because the wooden puppets absorbed it.
- After coating the puppets with varnish, the water started to slide off, making the rain effect clearly visible.



# Constrats

## Fog Machine Disruption

- When airflow hit the fog machine, it stopped producing visible smoke.  
so we Reduced direct airflow on the fog machine.  
Created timing coordination: first let the fog collect, then activate the fan to spread it effectively.



# Constrats

## Voice Recognition Sensitivity

- The system requires a quiet environment to accurately detect and understand voice commands.
- Background noise or overlapping sounds can cause misinterpretation or failure to respond.

## Low Audio Volume vs. Motor Noise

- The puppet voices and story audio were too quiet compared to the noise from motors.



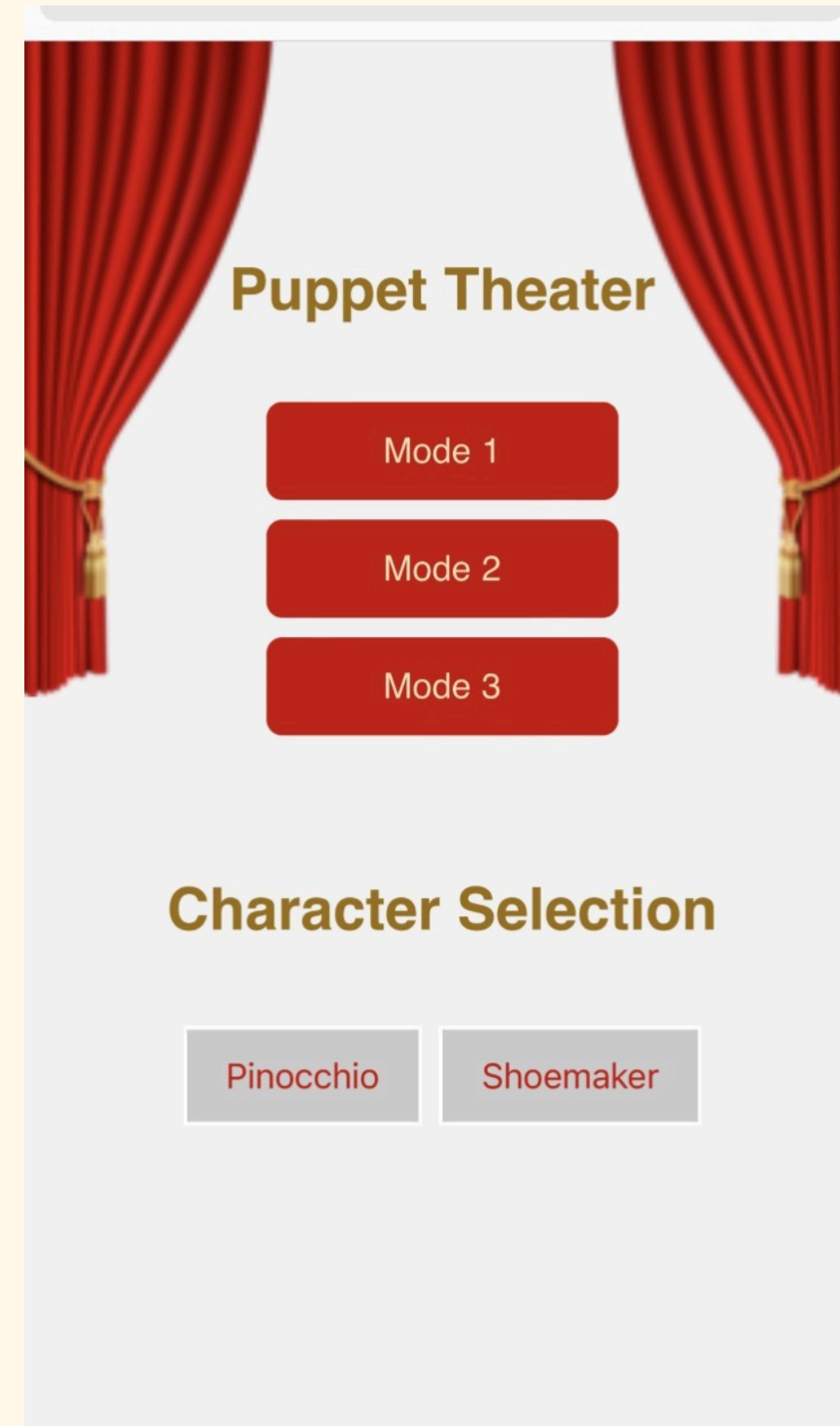
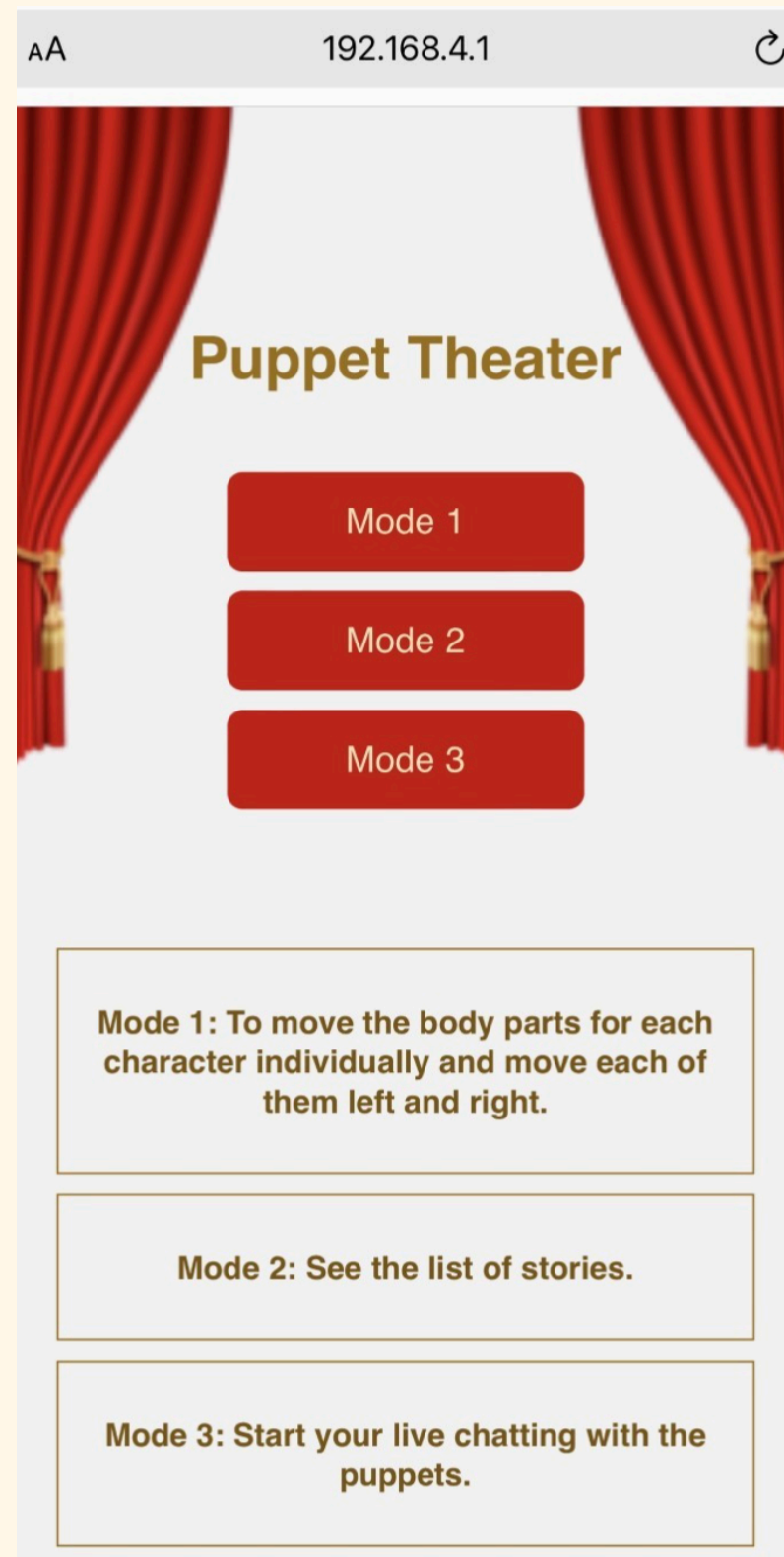
# Constrats

## Delay Function Limitation in Code

- Could not use `delay()` because multiple components needed to run simultaneously



# Web Page



# Web Page

## Character Selection

Pinocchio Shoemaker


Body  
Left Right

Hand Left  
Up  
Middle  
Down

Hand Right  
Up  
Middle  
Down

Leg Left  
Up  
Down

Leg Right  
Up  
Down

A cartoon illustration of Pinocchio, a young boy with a large red nose, wearing a yellow hat, a blue bow tie, a blue vest, and red shorts. He is standing with his arms at his sides.

## Character Selection

Pinocchio Shoemaker


Body  
Left Right

Hand Left  
Up  
Middle  
Down

Hand Right  
Up  
Middle  
Down

Leg Left  
Up  
Down

Leg Right  
Up  
Down

A cartoon illustration of a shoemaker, a man with a large brown head, a blue mustache, wearing a blue vest, a red tie, and dark pants. He is standing with his arms at his sides.

# Web Page

## Preprogrammed Stories

Learn Dancing With The Shoemaker  
(English)

Start

Stop

Learn Dancing With The Shoemaker  
(Arabic)

Start

Stop

Love Things Around You

Start

Stop

## Puppet Theater

Mode 1

Mode 2

Mode 3

## Chat with Puppets

Start Chat

End Chat

# Future work

## Custom Story Input

- Allow users to upload or write their own stories to be performed by the puppets.

## Add More Characters

- Increase the number of puppets to enable richer and more complex scenes.

## Character Selection

- Let users choose which characters they want to appear in the play.

## Facial Expression or Emotion Detection

- Use a camera to detect audience reactions (e.g., smiling or clapping) and let the puppets respond accordingly.



# Future work

## AI-Generated Stories

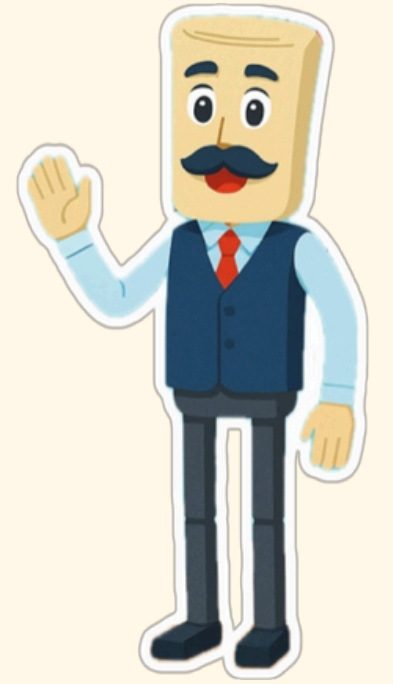
- Integrate AI to generate fun and unique stories for the puppets automatically.

## Changeable Nose Length for Pinocchio

- Add a motorized mechanism to extend or retract Pinocchio's nose when he lies, enhancing the storytelling effect.

## Automatic Scene Switching

- Backgrounds, sounds, and effects change automatically based on story progress or detected voice commands.



**THANK YOU**  
**ANY**  
**QUESTIONS?**

