



Texas A&M University Qatar

# GESTURE Guide

PROPOSAL PRESENTATION



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# Agenda

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# Introduction

- Physical impairments may make it more difficult for a person to interact with others and their environment.
- Technological developments have created new opportunities for people with physical disabilities to enhance their lives.
- Guide gesture control is one of the technologies that enables a person with a disability to use finger movements to interact with devices.
- The use of hand gesture control could enable people with physical disabilities to carry out tasks that might not be possible.



# Problem Statement

- Individuals with physical disabilities face significant challenges in maintaining independence within their homes.
- Current assistive technologies are costly and have limitations.
- There is a need for a cost-effective and non-intrusive solution to enhance the quality of life for patients with spinal cord injuries (SCI).

## Objectives

- Create a data glove for home automation that operates on indoor micro harvested energy.
- Provide an accurate and efficient system for individuals with physical disabilities to interact with their environment.
- Utilize hardware/software co-design principles, incorporating microcontrollers, sensors, cloud systems, and circuit designs.
- Focus on data acquisition, preprocessing, and feature extraction to empower individuals with physical disabilities.





# Methodology



## Conduct Comprehensive Literature Review

- Understand existing solutions
- Identify gaps in current research

## Implement Improved YOLOv5

- Enhance accuracy
- Increase speed in complex backgrounds

## Utilize Shape-Based Feature Detection

- Identify hand gestures
- Enable real-time gesture recognition for device control

## Explore Deep Learning Networks

- Focus on hand gesture recognition
- Integrate modules for learning short-term and long-term features

## Develop Human-Computer Interaction System

- Leverage human hand gesture recognition
- Enable effective interaction





# Estimated Budget



**1. Estimated Budget**

- The expected budget for the project is \$1818.63, with additional pieces included in case of damage.

**2. Total Cost Breakdown**

- Includes components such as Raspberry Pi, LCD screen, servo motors, resistors, power supplies, and more from various suppliers.

**3. Budget Allocation**

- Ensures the availability of necessary resources for the successful implementation of the hand gesture recognition system.









**4. Component Consideration**





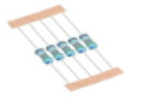
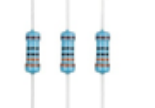

- Each component's quantity and price have been meticulously considered to stay within the estimated budget of \$1818.63.

**5. Budget Justification**

- Emphasizes the importance of having spare parts to address any unforeseen damages during the project development phase.

# Components List

No.	Name	Picture	Needs (piece)	1 Piece Price	Total (\$)	Shop
1	Raspberry Pi 5 - 8GB		4	94.49	377.96	Amazon
2	LCD HDMI 7 inch 1024x600 Touch Screen		4	45.99	183.96	Amazon
3	Raspberry Pi Dual Fans 5Vdc With Heat sink Cooling System		4	5.50	22.00	AliExpress
4	Raspberry Pi 27W USB-C Power Supply For Raspberry Pi 5		5	12.00	60.00	Canakit56
5	Clear Acrylic Case For Raspberry Pi Camera		4	8.90	35.60	Amazon
6	raspberry pi camera		4	35.00	140.00	Amazon
7	Micro SD 64GB		5	9.45	47.25	Amazon
8	Arduino Nano		4	24.90	99.60	Arduino Store

9	PCA9685 16-Channel 12-bit PWM Servo Motor Driver I2C Module for Arduino		5	8.99	44.95	Amazon
10	D-Planet [4-Pack] 5A DC-DC Adjustable Buck Converter 4~38v to 1.25-36v Step Down Power Supply High Efficiency Voltage Regulator Module		5	13.99	69.95	Amazon
11	MG995 Servo Motor 180° 12 kg.cm Metal Gears		10	39.40	394.00	Amazon
12	lm7809		8	0.41	3.31	Utmel
13	cap 100nF		10	0.70	6.99	Amazon
14	12v dc power supply 5A		5	9.98	49.92	Amazon
15	10k resistor		30	3.50	105.00	Amazon
16	330 ohm resistor		30	0.60	18.00	Amazon
17	Power Switch		12	1.12	15.29	Amazon



18	Project Box		5	26.99	134.95	Amazon
19	Pcb sheet fr4		10	0.99	9.90	Amazon
<b>Total</b>			<b>164</b>		<b>1818.63</b>	

Table 1 : Component list used





# Timeline



## Conduct Literature Review

- Understand the landscape of research in the field.
- Identify key studies and findings

## Explore Existing Systems

- Identify gaps for improvement.
- Analyze current hand gesture recognition systems

## Develop Project Methodology

- Focus on hardware - software co-design.
- Plan for prototyping

## Implement Proposed System

- Start with minimum viable product.
- Refine for energy efficiency



# Gantt Chart

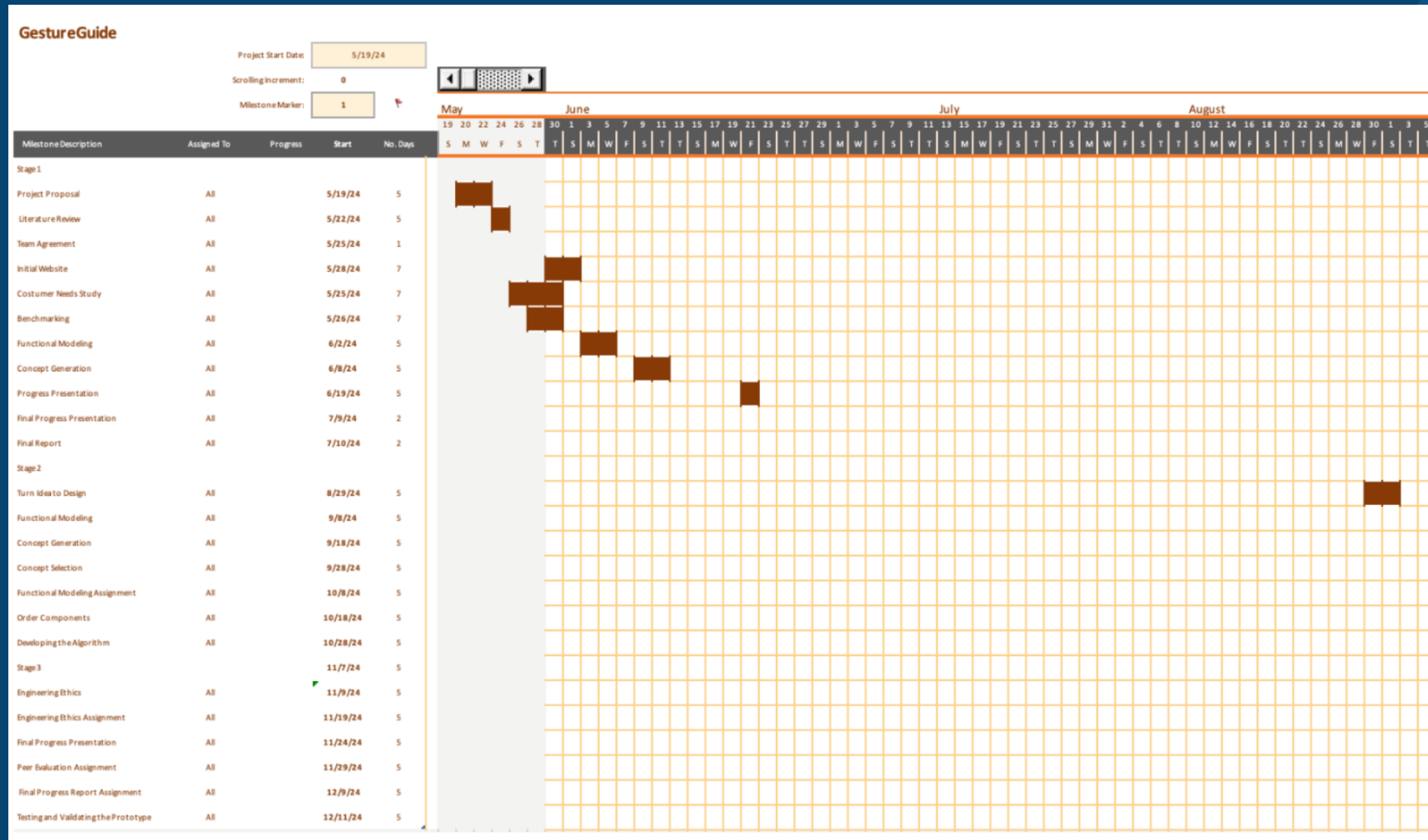


Figure 1: Gantt Chart of the project progress



# Conclusion

## Empowerment through Independence

- The proposed system aims to empower individuals with physical disabilities.
- Enables independent control of their environment through accurate hand gestures recognition.

## Enhanced Quality of Life

- Assists individuals with disabilities in efficiently accessing and controlling functions.
- Enhances quality of life with minimal effort.

## Seamless User Experience

- Framework designed to precisely identify various finger combinations as hand gestures.
- Provides a seamless user experience for individuals with disabilities.

## High Accuracy and Speed

- Utilizes computer vision methods or processing chips.
- Identifies different finger gestures with an accuracy rate of approximately 95%.
- Access time of up to 300 ms.

## Interaction with Electronic Devices

- Allows individuals with physical disabilities to interact with electronic devices.
- Enables performance of tasks that might otherwise be challenging.





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**THANK  
YOU**