



SMART SERVANT ROBOT

Project Proposal

EE6352 - EMBEDDED SYSTEMS DESIGN

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Group No 44

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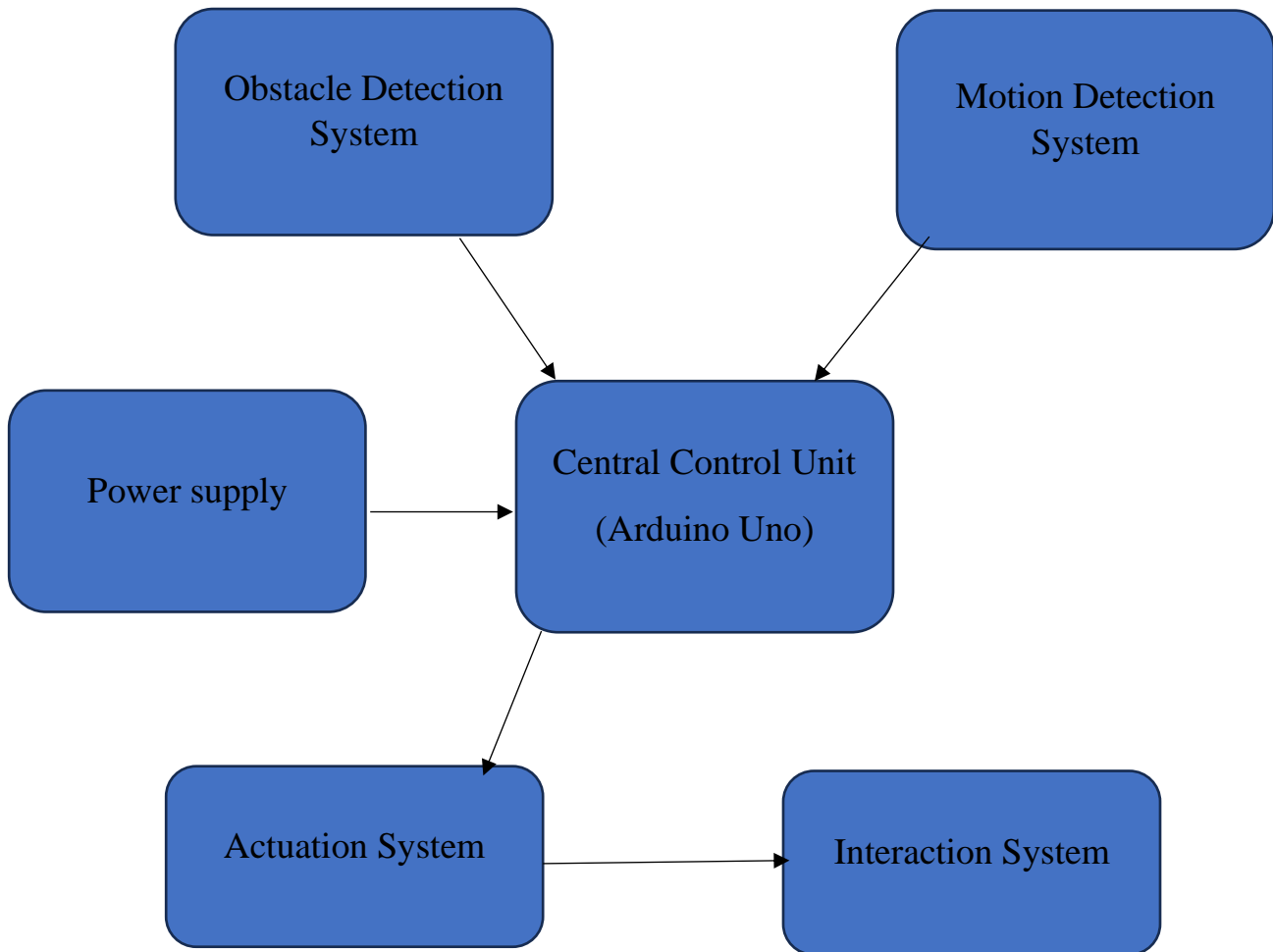
Introduction

The objective of this project is to develop a "Smart Servant Robot" capable of autonomous navigation in an office or event environment. The robot offers refreshments to individuals while avoiding obstacles along its path. The robot primarily moves in a straight line and changes its direction only when an obstacle or wall is detected. It integrates two essential systems: one for detecting and avoiding obstacles and another for handling human interactions through motion detection. The robot uses a base platform with wheels for mobility, driven by two motors. Its primary workflow involves navigating predefined routes, avoiding obstacles, and temporarily halting when motion is detected to enable interactions. This prototype focuses on refining the interrupt-driven workflow and navigation algorithms. The scope is limited to simple, flat office or event environments, allowing for iterative improvement in future versions.

Specifications

1. Autonomous Navigation: Moves independently in a straight line, adjusting its direction when obstacles are detected.
2. Obstacle Avoidance: Detects and navigates around obstacles to ensure uninterrupted movement.
3. Interrupt-Based Interaction: Responds to motion of human's by pausing its navigation workflow.
4. Human Interaction Mode: Stops near individuals in the ISR flow for a brief period to allow interaction.
5. Workflow Resumption: Returns to its original navigation routine after interactions.

Block Diagram and Description



Blocks:

1. Central Control Unit:
 - Manages all sensor inputs and outputs.
 - Processes workflows and handles interrupts during motion detection.
2. Obstacle Detection System:
 - Identifies obstacles along the robot's path.
 - Provides distance data to the central unit for navigation decisions.
3. Motion Detection System:
 - Detects the presence of individuals.
 - Triggers an interrupt service routine to pause the navigation workflow.

4. Actuation System:

- Propels the robot forward or backward and adjusts its direction.
- Executes commands from the central control unit.

5. Interaction System:

- Temporarily halts the robot for user engagement.
- Resumes normal operation after a predefined interaction period.

6. Power System:

- Supplies energy to the robot's components.
- Ensures steady and efficient performance.

References

<https://docs.arduino.cc/hardware/uno-rev3/>

<https://circuitdigest.com/microcontroller-projects/obstacle-avoiding-robot-using-arduino-and-servo-motor>

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<https://www.youtube.com/watch?v=oSLUJDV17XA&t=6s>