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Introduction :

Enter the amazing world of the Interactive Q&A Robot Project! Picture this: a world where robots, coding, and chatting come together for an awesome adventure! Imagine a cute robot buddy with a head and hand that can move around, just waiting to chat with you. Ask it anything, and guess what? It's smart enough to give you really cool answers—it's like having a super-smart friend by your side! But here's the best part: this project isn't just about having fun (though it's super fun!). It's also a fantastic way to learn new things. You'll get to explore special codes that make your robot do all sorts of amazing tricks. Plus, you'll even get to dive into something super exciting called artificial intelligence. It's like teaching robots to understand and talk to us humans! So, if you're ready for an adventure packed with learning and fun, then buckle up! We're going to use some really awesome technology called Arduino to make our interactive robots come to life. Welcome to the Interactive Q&A Robot project—where learning is easy and fun, and every question sparks a new discovery.

Process Model :

Each phase of the Spiral Process Model involves iterative cycles. After each cycle, reassess risks, gather feedback, and plan the next cycle with refined objectives. This ensures continuous improvement and adaptation to new insights, ultimately leading to a robust, user-friendly interactive Q&A robot.

1. Planning

Objectives and Requirements:

- Define the primary goal: To build an interactive robot capable of engaging in Q&A sessions.
- Identify user requirements: Users need a responsive, intelligent robot with basic movement capabilities and conversational AI.
- Develop preliminary schedules and budgets for hardware (e.g., servos for movement, Arduino board) and software (e.g., coding environment, AI algorithms).

Risk Analysis:

- Identify potential risks, such as hardware malfunctions, coding errors, or integration issues with AI.
- Develop mitigation strategies, like conducting preliminary tests on hardware components and creating a prototype for initial AI integration.

2. Engineering

System Design:

- Create detailed designs for the robot's physical structure, ensuring it can move its head and hand.
- Develop the software architecture, including the integration of AI algorithms for conversation and movement control via Arduino.

Prototyping and Simulation:

- Build a basic prototype using Arduino, sensors, and actuators to test movement and basic responses.
- Simulate AI responses to ensure the conversational logic works as intended.

3. Construction

Development and Assembly:

- Assemble the physical components of the robot, focusing on the integration of servos for movement and the Arduino board for control.
- Write and refine the software code for movement and AI conversation, ensuring they work together seamlessly.

Testing and Iteration:

- Conduct rigorous testing of both hardware and software components.
- Iterate based on test results, fixing bugs, improving movement precision, and enhancing AI response accuracy.

4. Evolution

User Feedback:

- Deploy the robot to a select group of users to gather feedback on its performance and user experience.
- Collect data on how users interact with the robot, noting any issues or areas for improvement.

Enhancements:

- Analyze user feedback to identify common problems or desired features.
- Implement enhancements and additional features, such as improved movement algorithms or expanded conversational capabilities.

5. Communication

Documentation and Training:

- Create comprehensive documentation detailing the assembly process, coding procedures, and AI integration.
- Develop user manuals and training materials to help new users get started with their interactive robot.

Stakeholder Communication:

- Maintain regular communication with stakeholders, providing updates on progress, challenges, and milestones.
- Organize demonstrations to showcase the robot's capabilities and gather further insights from potential users.

List of Tasks :

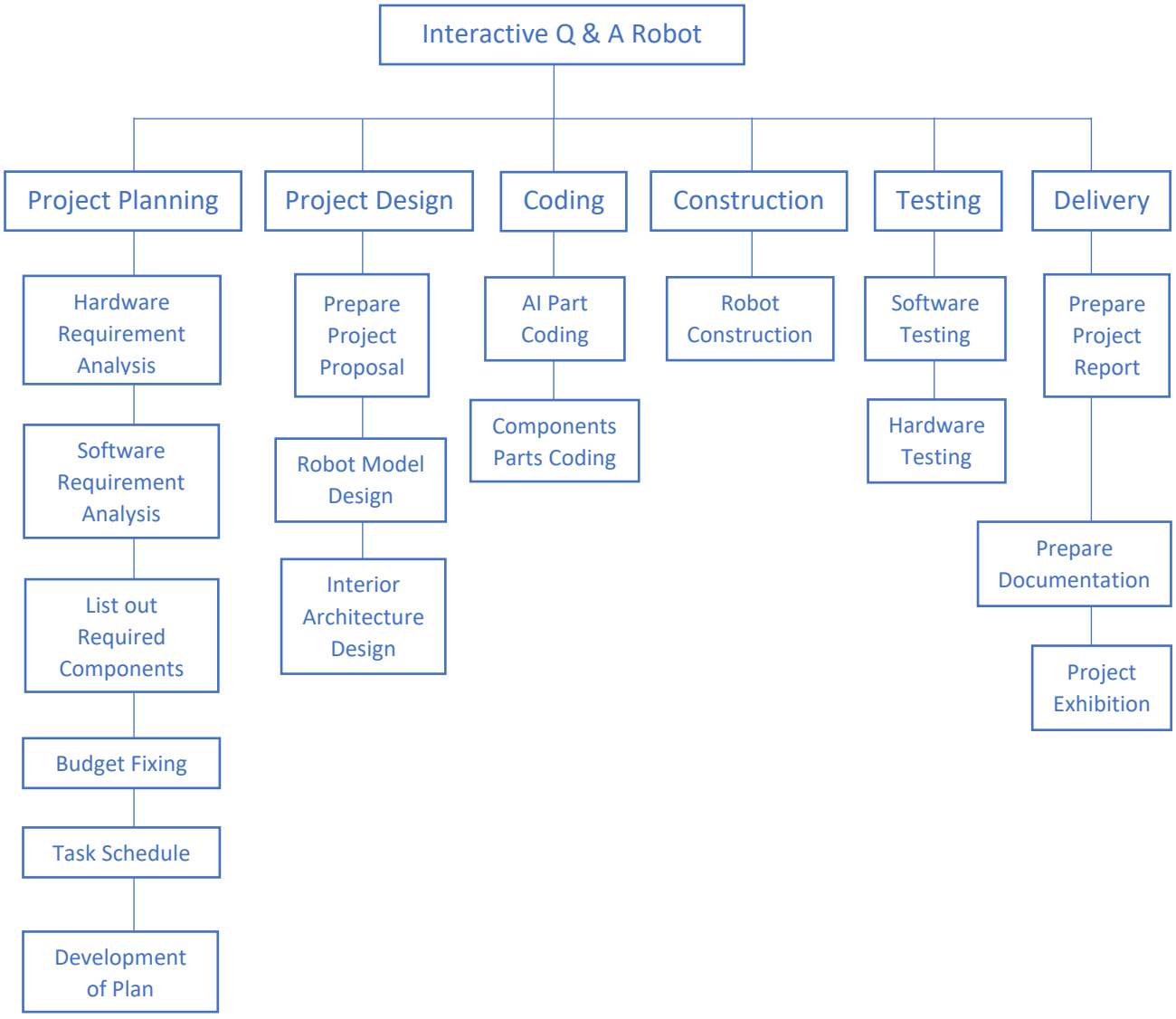

Figure: Work Break Down Structure

Staffing Plan :

Staffing Plan				
Name	**ID**	**Role**	**Responsibility**	**Duration**
Farhana Nishat Esha	12211057	Procurement Specialist	Ordering and managing the delivery of all necessary components for the robot.	06.01.2024 – 02.05.2024
Md. Tanvir Hossain Khondoker	12211079	Lead Software Engineer	Development and testing of the robot's software, including the AI, components movement part	06.01.2024 – 08.05.2024
Pronome Das Turna	12211133	Documentation Specialist	Compilation of all project documentation, including the project proposal, and final report.	06.01.2024 – 08.05.2024
Adiba Ahsan Adrita	12211135	Design and Assembly Engineer	Creation of the robot's design specifications and physical assembly of its components. *Physical assembly Phase done by all team members.	06.01.2024 – 04.05.2024

Monitoring and Control Mechanism :

To tailor the monitoring and controlling mechanisms for our Interactive Q & A Robot Project, consider the following adapted framework :

- **Regular Progress Meetings** :

- Scheduled weekly meetings with our team to evaluate the progress against the project timeline.
- Discussed the completion of tasks assigned to Md. Tanvir Khondoker (coding and testing), Adiba Ahsan Adrita (design), Farhana Nishat Esha (procurement), and Pronome Das Turna (project proposal, report and documentation).

- **Change Management :**

- Created a structured process to handle any requested changes in design, component selection, or project scope.
- Reviewed and approved changes collectively, ensuring they were feasible and beneficial before implementation.

- **Budget and Resource Management :**

- Kept track of the budget as Farhana Nishat Esha ordered components and made adjustments to stay within financial limits.
- Ensured that resources, including team members' time and project materials, are used efficiently.

- **Communication Plan :**

- Developed a plan detailing how updates and changes will be communicated within the team and to any stakeholders, such as university faculty.
- Maintained open lines of communication, especially when coordinating between the coding and assembly phases.

- **Quality Assurance :**

- Implemented a quality control system to check the software developed by Md. Tanvir Hossain Khondoker and the robot assembly completed by Adiba Ahsan Adrita, Pronome Das Turna and Farhana Nishat Esha .
- Regularly inspect the integration of software and hardware to preemptively address any potential issues.

Risk Management :

Objective : To identify, assess, and mitigate risks impacting the project's timeline and deliverables.

Risks can occur :

1. There can be defective components in the required components.
2. Dely in Components delivery can affect on construction of the project.
3. Poor communication among team members can increase the development & construction
4. Not following the project timeline of the project can delay project construction.

Mitigation Plan :

1. Defective Components :

- Implementing a quality assurance process to inspect and test components before they are integrated into the project.
- Maintaining a buffer stock of critical components to replace any defective parts immediately.
- Establishing relationships with multiple suppliers to ensure timely delivery of high-quality components.