Robotics Project Proposal

The goal of this robotics project is to design a robotic system with dual objectives: firstly, to pick up a basketball from a chosen position on the table using two robotic arms and successfully launch it into a nearby basket. Secondly, to create an engaging and interactive experience for both elderly individuals and children by utilizing these robotic arms to pick up a soft, lightweight ball and engage in playful activities, such as passing the ball with the users.

The project represents a combination of robotics, control systems, and entertainment, aiming to bring joy :D, social interaction, and physical activity to the lives of elderly residents in care facilities while also serving as a source of amusement and physical coordination practice for children. By combining these objectives, the project highlights the potential of robotics to enhance the well-being and happiness of different age groups through innovative and entertaining interactions, ultimately bridging the gap between advanced technology and meaningful human experiences.

The project's primary objectives include the design and implementation of the robotic arms, the development of control algorithms for precise manipulation, and trajectory planning. The robotic system's success will be measured by its ability to reliably pick up the basketball, accurately estimate the target basket's location, calculate an optimal throwing trajectory, and execute the throw with a high degree of accuracy and repeatability.

Key components of the project include:

Robotic Arm assembly: Two specialized robotic arms will be equipped with a combination of joints and motors that allow for delicate and precise manipulation of the basketball.

System Modeling and Analysis: The equations that describe the kinematics of our robot model will be derived and analyzed using Matlab. The projectile motion for the basketball motion is analyzed to obtain the equations of the projectile motion.

Trajectory Planning: A smooth trajectory will be designed in order to pick the ball in addition to another trajectory for throwing the ball with a certain firing angle and velocity.
Testing and Evaluation: Extensive testing and validation will be conducted to assess the system's performance, accuracy, and reliability under various conditions and scenarios. Adjustments and improvements will be made iteratively based on the results, the project will also be tested using Simulink and visualized using Simscape.

Right hand: Pick and launch the ball.
Left hand: Perform the same action as the right hand but mirrored.

Sincerely, SlamDunk Team :)