

## ABSTRACT

Robotic arm or manipulator have become very popular due to their high productivity and performance in industrial applications. A manipulator robot has at least one link, its flexibility and range can be increased based on the application. The 3 DOF robotic arm is the most used robotic arm with DOF that can move across 3 dimensions. Increasing the DOF can decrease the stability of the end effector, which results in decreased performance of the system and makes the system unstable.

The LQR control method is the choice to be applied to the 3 DOF robotic arm because multi-link systems such as robot arms are basically non-linear with quite complex modelling. Using conventional control methods has many trade-offs to find optimal stability between parameters on the robot arm. LQR is one of the optimal control methods that can produce a good system response for multi-link systems.

The results of the system specification test show that the 3 DOF robotic arm system can move an object in a predetermined workspace. The robotic arm shows the system response to the applied LQR control method according to the given Q and R parameters. The robotic arm system is also equipped with an interface application to process inputs and display outputs from the system. System development also pays attention to economic aspects to reduce development costs so as not to exceed specified limits. Overall, the 3DOF robotic arm system can demonstrate the effect of the LQR optimal control method with good results.

Keywords: Robotic Arm, LQR, Optimal Control, Application, GUI