

Design and development of a SCARA robotic arm for green house management

K.S.T. Dissanayake* & H.L. Subasinghe

Department of Engineering Technology, University of Ruhuna, Sri Lanka

**Corresponding author: dissanayakesachin83@gmail.com*

Abstract

This study details the kinematic modeling and design process for a 4-DOF SCARA-style robotic arm that is intended to use in an agricultural field. The labor-intensive process of harvesting fruiting vegetables traditionally for fresh market necessitates switching from arduous manual operation to continually automated harvesting. Million tons of fruits and vegetables are still hand-picked each year in open fields and greenhouses despite advancements in agricultural robots. Traditionally, manual picking has been used to reduce bruising during harvest. The need to invest in robotic solutions is partially a result of the high costs, scarcity, and low productivity of manpower. The SCARA robot arm can maintain the greenhouse and gather the fruits addressing those issues. This SCARA robot arm can be used for pick-and-place operations, handling of fruits, repeatability, and other applications requiring high speed and high accuracy. Additionally, water can be given to the fruit and vegetable pots in the greenhouse by the SCARA robot. However, because growers cannot collect the entire crop, the present options are not yet commercially viable despite demand from producers. In this project, a new SCARA robot arm that can harvest a variety of fruits is being developed. While reducing harvesting costs and eliminating the risk of labor unavailability and productivity, this technology will be extremely advantageous for growers.

Keywords: *SCARA robotic arm, Actuators, Robot kinematics, forward and inverse kinematics, End effectors*