

# Service Treatment Robot

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## Introduction

This project design offers an automated machine system for the large tanks surface treatment process. The purpose of this automated system is to reduce the manhour needed for the manual surface treatment process, ensure safer operation since it minimizes the human work, and ensure better surface treatment accuracy than the human work since it is an automated system.

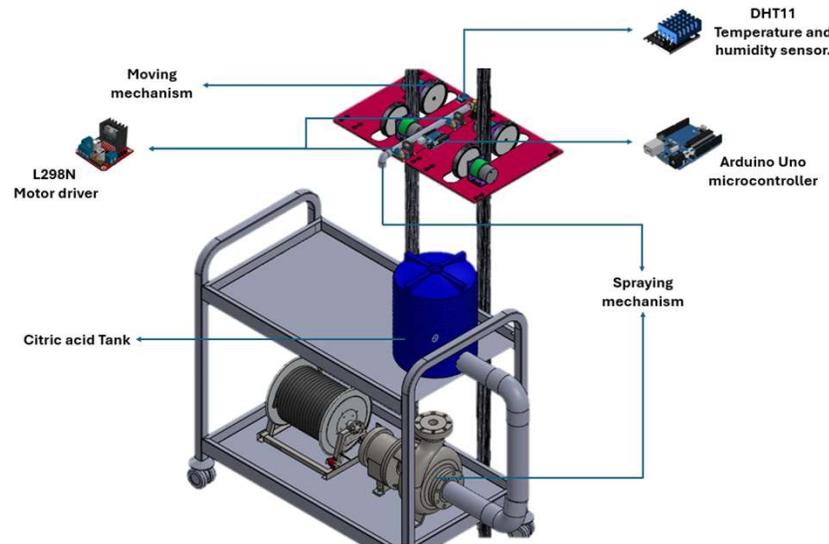
## Constraints

Budget	< 6000 ₺
Timeline	< 16 Week
Operational Temperature	20°C to 60°C

## Specifications

Weight	< 10 Kg
Set up Time	5-10 min
Climbing Speed	0.1 m/s
Motor Torque	< 15 Nm
Spray Pressure	20-30 psi

## Prototype

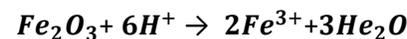


## Calculations

Since the concentration of the citric acid is 8%, meaning 8 grams of citric acid per 100 grams of solution.

$$\text{Mass of Citric Acid} = \frac{10}{100} \times 996.5 \times 5 = 498.25 \text{ gram}$$

The primary reaction occurring during the passivation process is:



This reaction demonstrates the removal of iron oxides from the tank surface through the citric acid application.

## Results

Budget	< 3000 ₺
Timeline	< 16 Week
Weight	763 g
Set up Time	7- 9 min
Climbing Speed	0.1222m/s
Motor Torque	Rated Torque(kg-cm) 0.97 Stall Torque(Kg-Cm) 3
Spray Pressure	21.755 psi

## Conclusion

The Service Treatment Project has been completed, fulfilling its design objectives and operational requirements. Through the use of automated systems and efficient delivery mechanisms, the project ensures consistent and effective treatment performance. It promotes safety, reduces manual effort, and supports long-term sustainability. Future improvements could focus on enhancing system precision, increasing automation, and optimizing material use to further improve performance and adaptability in various operating conditions.