Tank Robot with Soft Robotic Arm

Team TAKE OFF

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## Keywords

Soft Robotics, Tank Structure, Automated Guided Vehicle

Introduction

Intelligent materials handling robots play a vital role in the field of manufacturing industry, and have been extensively used for agricultural & industrial automation, which greatly improve the efficiency of production. The specific objective of this study was to design a robot possessed the ability of surmounting obstacles and precisely grasping.

Methodology
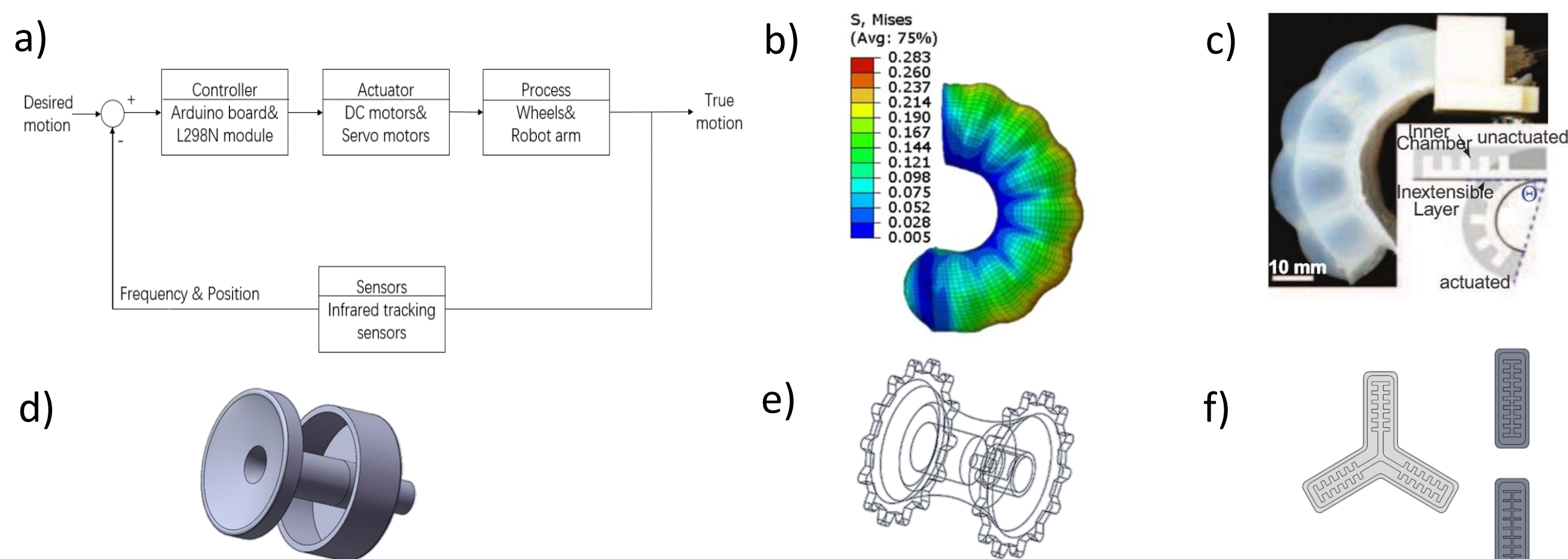
a)The close-loop control system. b)Simulation & experimental results for bending actuators in the case of inflation[1][2]. c)Function principle of grasp. d&e)Wheels'3D model. f)Silicon rubber molds of soft robotic arm

Procedure and Results

Project Design: Based on Arduino Mega, tank robot will be actuated by both driving&load-bearing wheels. Meanwhile, the process of handling will be controlled by the switch of air pump and solenoid valve. 3D printed molds and Ecoflex 00-30 are applied to modeling the soft robotic arm.

Programming & Data Testing: Basic tracing& steering ability are achieved in programming process. Using differential straight line and delay makes it possible for tank to go straight and the soft manipulator arm clip objects.

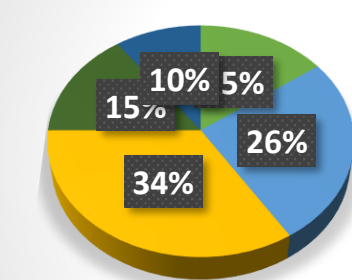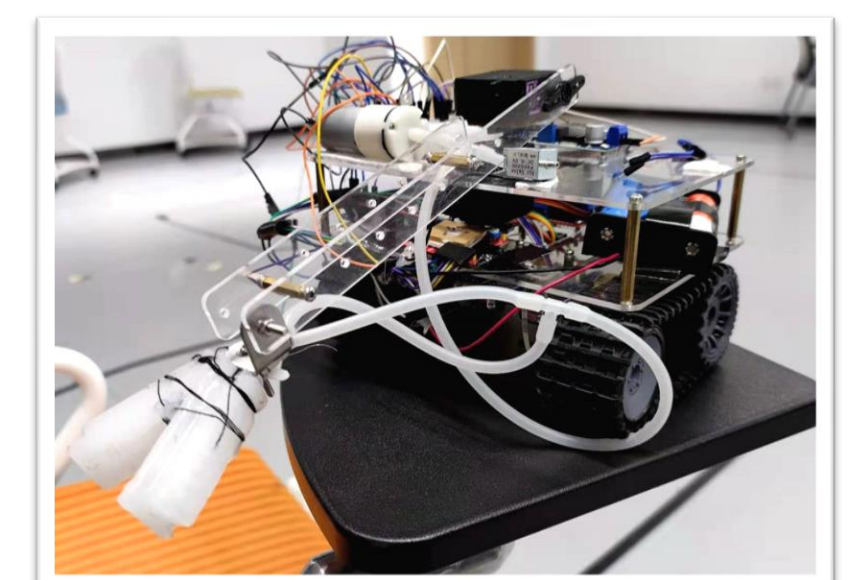**Debugging**
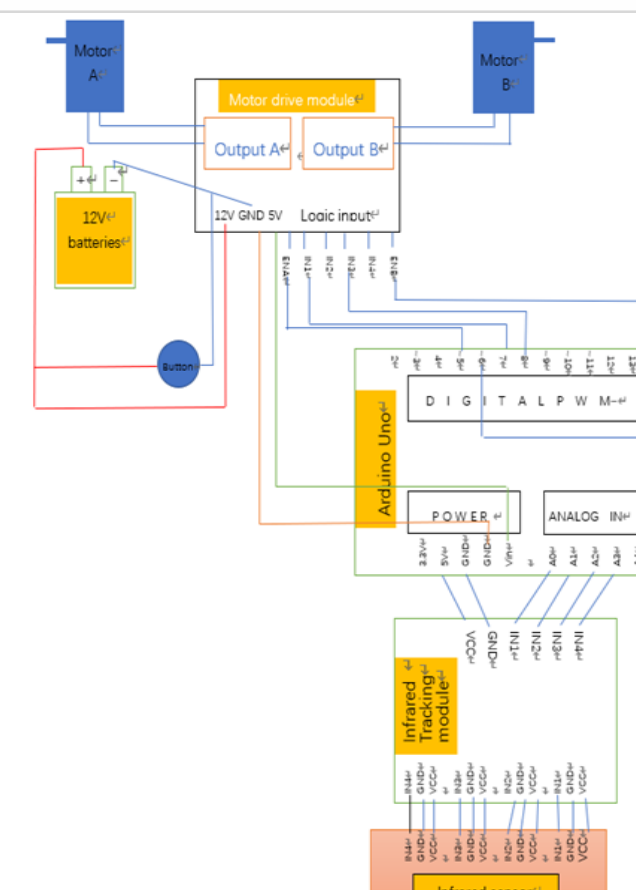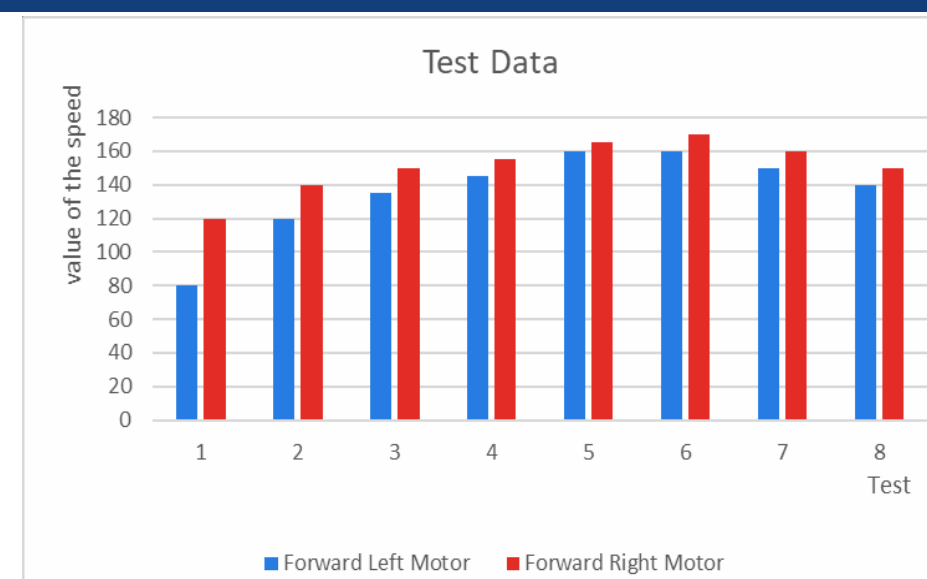
Discussion and Analysis

Figure of time allocation

This study confirms that tank structure and soft grasper enhance the efficiency. However, issues about the accuracy of steering and grasping are emerged. Testing for rotation rate difference and two-claw soft robotic arm do reduce the errors.

Conclusions

This approach will prove useful in expanding understanding of how to apply soft robotics and tank structure to object transportation, which may have implications for future practice on industrial automation

Acknowledgement

References

[1].https://softroboticstoolkit.com
[2]. G. Agarwal et al "Stretchable Materials for Robust Soft Actuators towards Assistive Wearable Devices," Nature, 2016.