

The 10th Asian Control Conference 2015 (ASCC 2015)

Date: 31st May - 3rd June 2015

Venue: Kota Kinabalu, Malaysia

Theme: "Emerging Control Techniques for a Sustainable World"



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#102 (1570073913): Development and Performance Evaluation of a linear actuator based Wearable Assistive Device



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10th Asian Control Conference 2015- Invited Sessions - IS_Saleh

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Title

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Development and Performance Evaluation of a linear actuator based Wearable Assistive Device

For an assistive device to be usable in carrying out activities of daily living, it is highly important that the device be compact, light in weight and portable. It is even more important that the device be comfortable and safe to use. As different people have different hand sizes, the assistive hands must be designed considering the variety of hand sizes that can be accommodated without any compromise in safety or comfort. This can be best achieved by making use of a joint less structure that takes the shape of the hand that wears it. This paper proposes the design of an assistive device that is lightweight, compact, safe and comfortable. This device assists the hand in gripping objects used in daily life activities. The performance evaluation of this device is carried out by measuring the grip-force exerted by the finger-tip on the object. The maximum range of grip-force exerted by this assistive hand is between 2.5 to 4.5 N. The minimum grip-force that can be applied is 0.9 N. The experiments conducted show the viability of the assistive device.

Abstract

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For an assistive device to be usable in carrying out activities of daily living, it is highly important that the device be compact, light in weight and portable. It is even more important that the device be comfortable and safe to use. As different people have different hand sizes, the assistive hands must be designed considering the variety of hand sizes that can be accommodated without any compromise in safety or comfort. This can be best achieved by making use of a joint less structure that takes the shape of the hand that wears it. This paper proposes the design of an assistive device that is lightweight, compact, safe and comfortable. This device assists the hand in gripping objects used in daily life activities. The performance evaluation of this device is carried out by measuring the grip-force exerted by the finger-tip on the object. The maximum range of grip-force exerted by this assistive hand is between 2.5 to 4.5 N. The minimum grip-force that can be applied is 0.9 N. The experiments conducted show the viability of the assistive device.

Keywords

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Assistive hand; Wearable; Linear Actuator; Force Sensing Resistor; Grip force

Topics

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Sensors & Actuators; Mechatronics Systems

Presenter(s)

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Tanveer Saleh, Saleh (bio) 🗑️

Registration code

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by0942f7cb

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Revisions

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Personal notes



You are a TPC member for this conference. You are an author and a track chair for this paper.

Reviews

2 ASCC 2015 Review Forms +

Review 1 (Reviewer B)

Originality	Suitability of Topic	Theoretical contribution	Presentation	Overall Rating
Good (4)	Suitable (3)	Minor (3)	Good (3)	Accept with minor revision (2)

Guidance for Authors (Please describe in detail main paper contributions, positive aspects, observed deficiencies, and suggestions on how to improve them:)

This paper presented the design for a linear actuator driven, joint-less and lightweight assistive hand. I think some following additional explanations are necessary.

1. The relation between Fig1. and Fig.2 is not clear.
2. The derivation equation (1) to (6) is not clear.
3. In the sentence above equation (7), I am not sure why MCP angel theta is zero.
4. I think it is better to show the precise description about Finger Model and Linear Actuator Model.

Review 2 (Reviewer A)

Originality	Suitability of Topic	Theoretical contribution	Presentation	Overall Rating
Good (4)	Very Suitable (4)	Major (5)	Very Good (4)	Accept (1)

Guidance for Authors (Please describe in detail main paper contributions, positive aspects, observed deficiencies, and suggestions on how to improve them:)

This paper is shown an assistive device design which is applying linear actuator without a joint, for improving a quality of life by restoring a pinching function. At the first, it is shown a design concept in the study and a mathematical model for the design. In this study model, two tendon wires which are connected a linear actuator are used. A grip force generated by the actuator is measured by force sensing register, and a position of the actuator is measured by liner potentiometer. The proposed system is evaluated in real use, and the results are interesting for these assistive device researcher.

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