



Cawangan Kedah  
Kampus Sungai Petani

Faculty of Administrative  
Science and Policy Studies

# i-SPIKE 2021

*Leading An Artificial Innovation In Knowledge, Education And Design*

## **i-SPIKE 2021 INTERNATIONAL EXHIBITION & SYMPOSIUM E-PROCEEDINGS**

<https://ispike2021.uitm.edu.my/>

e-ISBN 978-967-2948-20-9

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Layout Editor : Asrol Hasan

Cover Design : Syahrini Shawalludin

Published by : Universiti Teknologi MARA Cawangan Kedah,  
Kampus Merbok,  
08400 Merbok,  
Kedah,  
Malaysia.

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## EZ-CRUTCHES 2.0: AN INNOVATION OF ASSISTIVE DEVICE FOR DISABLED PERSON

Suzana binti Yusof

Centre for Nursing Studies, Faculty of Health Sciences, Universiti Teknologi MARA Puncak Alam Campus  
suzanay@uitm.edu.my

Sharifah Shafinaz binti Sharif Abdullah

Centre for Nursing Studies, Faculty of Health Sciences, Universiti Teknologi MARA Puncak Alam Campus  
shasya@uitm.edu.my

Fatimah binti Sham

Centre for Nursing Studies, Faculty of Health Sciences, Universiti Teknologi MARA Puncak Alam Campus  
fatimah2886@uitm.edu.my

Norhafizatul Akma binti Shohor

Centre for Nursing Studies, Faculty of Health Sciences, Universiti Teknologi MARA Puncak Alam Campus  
norhafizatul@uitm.edu.my

### ABSTRACT

Successful management of disabled person including those with medical conditions especially at lower limbs (legs) is a critical and long term process that can be compromised by many factors such as late ambulation and rehabilitation. Though the usage of assistive devices is established for any types of limbs-related condition, such as a wheelchair, walking frame and elbow crutches; the use of axillary crutches is the most common and convenient one. These axillary crutches are assistive devices that help the disabled person in the process of early ambulation, which can provide support to the weak, injured, fractured or post-operated leg. Thus, this project aims to innovate the axillary crutches into the most client-friendly to support the disabled person in the recovery process, which is named Ez-Crutches 2.0. This innovation provides an enhancement in handling axillary crutches without hustle. Imagine if the disabled persons are using the common axillary crutches, when they want to reach something above the head, they need to uplift hands and leave the crutches to fall down. It is difficult for them to pick up the laid crutches from the floor, and it may lead them to fall and cause further injuries. In clinical settings, early ambulation process supported with assistive devices would contribute to faster recovery process, improve the person's quality of life, have a sense of independence, and improve management outcomes. Therefore, the Ez-Crutches 2.0 will offer a new potential device that contributes in the enhancement of therapeutic intervention in the medical field especially for those disabled persons.

**Keywords:** crutches, medical, assistive devices, ambulation, disabled person

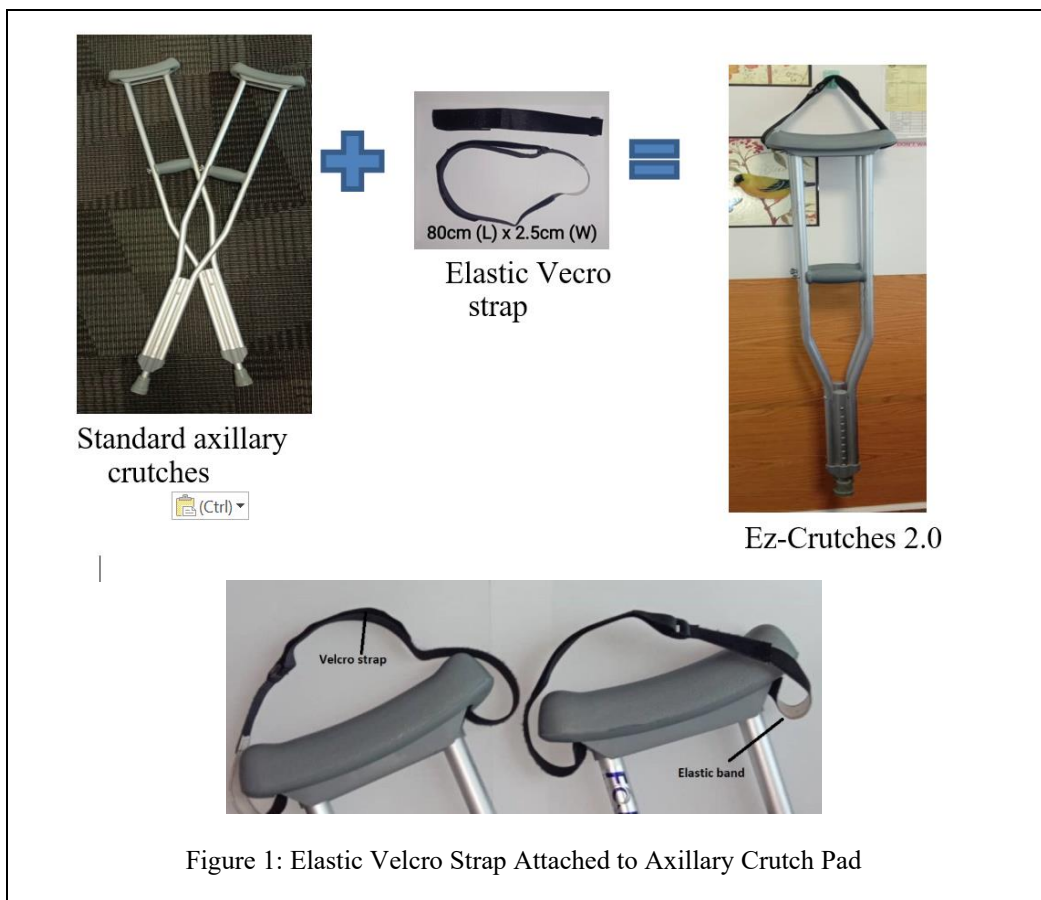
### INTRODUCTION

Crutches are medical instruments intended to help with ambulation by moving body weight to the chest and arms from the legs (Nagasaki et al., 2014). These crutches help person in

early ambulation to support the weak, injured, fractured, or post-operated leg. The objectives of this project are to innovate the standard axillary crutches into the most client-friendly assistive device for disabled person and to introduce the usage of Ez-Crutches 2.0 to public. The Ez-Crutches 2.0 is the combination of standard crutches with an elastic Velcro strap to enhance the handling of the standard axillary crutches without hustle.

## MATERIAL AND METHOD

This innovative product is ideated from standard axillary crutches, enhanced with an elastic Velcro strap. The Ez-Crutches 2.0 prototype is designed with 80cm length x 2.5cm width, adjustable according to the user's shoulder circumference size as it is sewed with a durable elastic band as shown in Figure 1. This elastic Velcro strap is attached to the axillary crutch pad. The user needs to put the strap on, and this unique design can hold the crutch in place when the user lifts hands. Without it, the crutches would drop, making it difficult for the user to pick them up and cause further injury.



## NOVELTY AND UNIQUENESS

The Ez-Crutches 2.0 has its uniqueness especially the elastic Velcro strap which is inspired from Velcro book band and rubber waistband used by tailors to make skirt which is cheaper material but durable. The novelty of this strap can give new insight of ambulation tool for disabled persons.

## WHAT IS NEW?

This Ez-Crutches 2.0 is the continuation project from Ez-Crutches 1.0. This time we introduce new pattern and attractive colors of elastic Velcro strap specially designed for children. However, the function and the durability of the item is not compromised.

## FINDINGS

To testify the feasibility and usage of the Ez-Crutches 2.0, a market survey was conducted among 5 clients with orthopedic related problems, and 5 registered nurses. They were given a set of standard axillary crutches and let them try to use them and right after that, the Ez-Crutches 2.0 was introduced. Then they were asked to answer questions regarding this innovation via a google form. About 70% of them gave *very positive reactions* to the prototype. Eighty per cent of participants rated that this is *something needed* and 100% said that this is a *high quality* of the prototype. This innovation focuses on facilitating orthopedics clients with the simple, feasible, and affordable prototype. Contrary with previous product innovation which aimed to correct common issues associated with the use of the axillary (underarm) crutch such as pinched nerves, poor posture, and exhaustion with the use (Stencler, 2019). Other study proposed an alternative design for an enhanced crutch shoe, designed to increase the versatility of the crutch while keeping it affordable and compatible with existing crutch frames (Brown, Vairis, Masoumifar & Petousis, 2020). Extensive search found out a limited study related to crutches found in Malaysia, thus, the Ez-Crutches 2.0 provides a different view of innovation in enhancing client management care. Therefore, to protect the copyright of this innovation, Intellectual Property Right (IPR) has been applied from iRMIs on 30 September 2020 with IP code CR002017.

## BENEFIT TO MANKIND

The Ez-Crutches 2.0 is practical and easy to be used among patients who need assistance for ambulation especially disabled persons with medical conditions, orthopedic problems, post-operative or persons who have legs problem. This innovation provides patients hands-free mobility and secures the crutches during ambulation.

### Simple:

The elastic Velcro strap is adjustable and stretchable, provides comfort and easy to the user. Easy to be stored and easy to be applied.

### Feasible:

It keeps the crutches in place, prevents the crutches from drop when the user lifts up hands. Just apply the strap on the standard axillary crutch pad.

#### **Affordable:**

This product is cost effective as the Elastic Velcro strap costs less than RM10 and not cause much difference in standard crutches' cost.

### **POTENTIAL FOR COMMERCIALIZATION**

Even though the Ez-Crutches 2.0 is still under the prototype version, but the potential to be commercialized is huge due to its convenience and purpose in assisting disabled people with ambulation. It also plays an important role for health care providers in the medical, surgical, and orthopedic field, educators, and students in the medical and health sciences study. With the Velcro strap cost is less than RM 10 per pax, it will be affordable for all because it does not incur a huge additional amount for standard crutches.

The Ez-Crutches 2.0 prototype version has the potential to be commercialized in the medical devices market. The idea of this innovation could be proposed to the Malaysian Orthopedics Association for support and endorsement. We could also approach the crutches' manufacturers in Malaysia such as GNT MediXcel Sdn. Bhd. for business collaboration. Thus, the Ez-Crutches 2.0 will be offering a new potential device that enhances the therapeutic intervention in patient management.

### **CONCLUSION AND FUTURE PLAN**

The Ez-Crutches 2.0 will be offering a new potential assistive device that enhances the therapeutic intervention for disabled people and in the medical industry. This project's extension would be proposed to the Malaysian Orthopedic Association for an endorsement of the Ez-Crutches 2.0 usage and crutches' manufacturers in Malaysia such as GNT MediXcel Sdn. Bhd. for business collaboration.

### **ACKNOWLEDGEMENTS**

This Ez-Crutches 2.0 innovation is a self-funded project. All members would like to convey our special gratitude to the Centre for Nursing Studies, Faculty of Health Sciences, UiTM Puncak Alam who gave us the opportunity to proceed with this project and participate in the i-SPIKE2021. We also want to thank everyone who helped us, involved directly or indirectly in completing our Ez-Crutches 2.0 project.

### **AWARDS**

1. Golden award: Penang Invention, Innovation and Research Design 2021 (PIID 2021)
2. Silver award: International Innovation, Invention and Design Competition (INDES2020)

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\*Corresponding Author:



Suzana Yusof is a senior nursing lecturer working at the Faculty of Health Sciences, UiTM, Puncak Alam campus. She holds a Master of Nursing from Universiti Teknologi MARA, Puncak Alam. She is passionate about teaching and learning as well as joining innovation events such as i-SPIKE2021.

Contact no: 012-3659680  
Email: [suzanay@uitm.edu.my](mailto:suzanay@uitm.edu.my)



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