



Intelligent Manufacturing & Mechatronics

Proceedings of Symposium, 29 January 2018, Pekan, Pahang, Malaysia

Editors: **Hassan**, Mohd Hasnun Arif (Ed.)

Mohd Hasnun Arif Hassan
Editor

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Preface

The Symposium on Intelligent Manufacturing and Mechatronics (SymposIMM) 2018 was held at Universiti Malaysia Pahang in Pekan, Pahang, Malaysia, on 29 January 2018. It was organized by the Faculty of Manufacturing Engineering, Universiti Malaysia Pahang (UMP), in collaboration with the Faculty of Manufacturing Engineering of Universiti Teknikal Malaysia Melaka (UTeM), Melaka. Both parties aimed to provide a platform for deliberating empirical and theoretical research that are foreseen in the context of Industry 4.0. With the theme of “Strengthening Innovations Towards Industry 4.0”, it is the first dedicated symposium to Industry 4.0 hosted by the organizers. The symposium was graced by a vivacious keynote speech entitled “The Ideas of Mechatronics” by Prof. Ir. Dr. Wan Azhar Wan Yusoff.

This symposium enticed 120 submissions from authors nationwide. All submissions underwent a strenuous peer review process from members of the Peer-Reviewing Technical Committee. The reviews were based on the manuscript’s relevance to the tracks, novelty of the findings, the importance and presentation of the studies towards the particularity of Industry 4.0’s current trends. Following the review process, only 65 submissions made it into the symposium, 15 submissions were withdrawn, and 40 submissions were rejected due to various reasons. The accepted submissions were divided into five tracks covering various scopes of manufacturing engineering and mechatronics stream, namely Intelligent Manufacturing, Robotics, Artificial Intelligence, Instrumentation, and Modelling and Simulation. This book was divided into five parts based on the aforementioned tracks.

We would like to express our gratitude to all members of the Organizing Committee, without which the organization of this symposium would never be possible. Special thank goes to the management of the Faculty of Manufacturing Engineering, Universiti Malaysia Pahang, for the support towards the successful organization of the symposium. Further, we would like to extend our thanks to all authors for their participation in the symposium and their valuable contribution to this book. Last but not least, we would like to appreciate the help from the

publisher, especially to Dr. Christoph Baumann and Mr. Arumugam Deivasigamani. We hope that the contents of this book will benefit the readers in embracing the new era of industrial revolution 4.0.

Pekan, Pahang, Malaysia
January 2018

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Development of a Soccer Ball Launching Device

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Abstract. Soccer players are allowed to use their heads to direct the ball to the teammates during the game. Studies have shown that purposeful heading of the ball in soccer might cause long-term traumatic brain injury. In order to analyze the impact of soccer heading on the brain in the laboratory, a device that can launch the ball at constant speed is required. This project aims to develop a device, which can launch the ball towards a target such as an instrumented dummy headform at desired speeds. Two counter-rotating wheels that are rotated by two AC motors were used as the launching mechanism. The use of AC motors is economical, but their speeds cannot be easily controlled. Thus, a release mechanism that automates the switching of the motor as well as feeding the ball was developed. Testing shows that the device is capable of launching the ball up to a maximum speed of 18 m/s. This corresponds to the reported maximum heading speed in soccer. The use of the release mechanism allows the ball speed to be varied. A soccer ball launching device was successfully developed. The device is not only economical, but also capable of launching the ball at desired speeds.

Keywords: Soccer Ball Launcher, Ball Shooter.

1 Introduction

Soccer is the most popular sport in the world with an active involvement of more than 265 million people worldwide. The uniqueness of this game is that it permits the purposeful use of the head in directing the ball to the teammates or even scoring goals. This manoeuvre is termed 'heading'. A soccer player could be subjected to six to seven occasions of heading in a game [1] with an estimation of approximately 800 headings a year [2]. This purposeful use of the head in soccer has raised concerns as to whether it could lead to brain trauma injury.

Many studies have linked purposeful heading in soccer to brain trauma injury, similar to that found in mild traumatic brain injury (mTBI). Both amateur and professional soccer players were evaluated in the past decades. This was done through a series of