**Copyright**

“The author and the adviser authorize consultation and partial reproduction of this capstone for

personal use. Any other reproduction or use is subject to copyright protection. Citation should

clearly mention the reference of this work.”

Malayan Colleges Laguna, 2018

**The Adviser The Authors:**

**Prof. Dennis A. Martillano Al Fahad D. Chowdhury**

**John Chrisostom M. Dellosa**

**Rafael Jose P. Mangoma**

**Abigail A. Murcia**

**Biographical Sketch**

AL FAHAD DAPITILLO CHOWDHURY, born in Bangladesh, moved to the Philippines in 2014 for higher education. He enrolled at Malayan Colleges Laguna takes up Bachelor of Science in Information Technology with the Specialization of Mobile and Web Technology. Throughout his college days, Al Fahad managed to work with several programming languages like C, C++, C#, ASP.net, Java and Swift. In 2017, he won an Android App Development Competition at University of Makati. During his OJT (On the job training), Al Fahad worked as a lead programmer at the Biñan City Hall, where his team developed an Informative Kiosk.

JOHN CHRISOSTOM MALAQUILLA DELLOSA, is a Bachelor of Science in Information Technology student in Malayan Colleges Laguna. He lives in Biñan. He is knowledgeable in programming languages, such as Visual Basic, C++, C#, ASP.NET, Php, Java and Swift. He developed a new last pay monitoring system for ON Semiconductor Philippines Inc. to be used by their Human Resources.

RAFAEL JOSE PERLAS MANGOMA is a Bachelor of Science in Information Technology student in Malayan Colleges Laguna. He lives in Santa Rosa, Laguna. He is knowledgeable in several programming languages, such as C++, C#, ASP.NET, and Java. He has developed and design several websites during his internship at Ampleon Philippines Incorporated such as their Quality Department Website, Phone Directories System and Electronic System Job Request.

ABIGAIL ALCANTARA MURCIA is enrolled at Malayan Colleges Laguna taking up her Bachelor of Science in Information Technology with the Specialization of Mobile and Web Technology. She is knowledgeable in C#, Swift, Php programming. She is currently taking her OJT at Excelitas Technologies. Basically. She’s an outgoing and patient type of girl. She hopes to be the best person she can be in the future.

**Acknowledgement**

We would like to express our deepest gratitude to our Capstone adviser, Mr. Dennis Martillano, for his unceasing guidance, enthusiastic encouragement and useful critiques for this project and research. This project has been successfully accomplished due to his never-ending assistance and guidance.

We would also like to thank our parents and families who continuously encouraged us through the entire project and also the families that allowed the group to stay in their respective homes that enabled the project to significantly progress.

We would also like to thank our locale, SPED Carmona, especially Ms. Ronalyn Manongsong and her brilliant students for their full cooperation and support during and after the study.

**Abstract**

As a developing country, the number of people with visual impairment in the Philippines increases alongside its population. In the school year 2012 – 2013 of SPED’s early enrollment, out of total 40,181 Children with Disability (CWD) all over the Philippines, 4,925 of them are visually impaired with a total of 509 of this figure are from CALABARZON. Although the Philippine government is doing its best to cater the needs of the visually impaired by providing basic resources, access to advanced assistive technologies remains to be an issue. For example, the Elementary SPED School in Carmona only has slate and stylus as their form of learning braille notation writing. This study is design to develop a Braille notation writing device called PinDOTS. Having low-cost and readily available microcontroller like Arduino and materials that is durable and can be used for actual writing. The braille device is easily accessible in terms of functionalities and low-cost. PinDOTS is a portable device that can be used by the visually impaired as a tool in learning the basic braille notation. The braille device also focuses on the keying and pressing of dot sequences that can help the use of student’s kinesthetic and proprioceptive skills. With the help of Modified-Nurun Based methodology, the developers were able to develop a device that met the objectives and core functionalities as a braille notation writing device. This study shows that PINDOTS is a great tool that can be used both by the SPED teachers and visually impaired students based on the testing that was conducted on the locale. The results showed that the design of the mobile application is appropriate, and it is easy to navigate, while the braille device is portable, and near to the standards of other commercial braille devices

**Table of Contents**

Title Page

Approval Page

Copyright i

Biographical Sketch ii

Acknowledgement iii

Abstract iv

Table of Contents v

Introduction 1

Review of Related Literature 14

Methodology 31

Results and Discussion 37

Conclusion 59

Recommendations 60

References 77

Appendices 61

Definition of Terms 6

List of Appendices 61

List of Figures 80

List of Tables 81