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FACULTY OF ENGINEERING

DEPARTMENT OF COMPUTER ENGINEERING AND INFORMATICS

FINAL YEAR PROJECT REPORT

AN AUDIO-ENABLED SMART WHEELCHAIR

BY

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A FINAL YEAR PROJECT REPORT SUBMITTED TO THE DEPARTMENT OF COMPUTER ENGINEERING IN PARTIAL FULFILLMENT FOR THE AWARD OF A BACHELOR OF SCIENCE IN COMPUTER ENGINEERING OF BUSITEMA UNIVERSITY

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DECLARATION

I SSEMAMBO CHRISTOPHER, hereby declare that this report, written in partial fulfilment of the requirement of the award of a Bachelor of Science in Computer Engineering degree at Busitema University, is my very own authentic work and the content of this document has never been submitted before to the Department of Computer Engineering and Informatics of Busitema University and any another institution of high education.

Signature ..... **Date** 27.09.2023.....

SSEMAMBO CHRISTOPHER

APPROVAL

This is to certify that the project entitled "AN AUDIO-ENABLED SMART WHEELCHAIR" has been produced under my supervision.

SUPERVISOR

NAME: Mr. Alunyu Andrew Egwar

Department of Computer Engineering and Informatics

Signature: .....

Date: 06/10/2023

DEDICATION

I dedicate this report to God Almighty my creator, my strong pillar, my source of inspiration, wisdom, knowledge and understanding. He has been the source of my strength throughout this project and on His wings only have I soared.

I also dedicate this report to my family that has encouraged me all the way and whose encouragement has made sure that I give it all it takes to finish that which I have started.

God bless you.

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ABSTRACT

Wheelchairs are crucial for people with physical disabilities, but traditional manual handling can be challenging or impossible for those without hands or with age-related limitations. To address this, a voice-controlled wheelchair has been developed using Arduino and a voice recognition module. This system identifies spoken commands and matches them with actions predefined for the chair's motion. By converting voice commands into digital signals, the wheelchair responds accordingly. Through simple voice prompts, the wheelchair can navigate various directions effectively, enhancing mobility and comfort. This innovation empowers people who struggle with manually hand-controlling the wheelchair. However, current commands have been programmed in English. Future works should focus on customizing this innovation to respond to local languages such as Luganda, Swahili, and Luo, among others.

LIST OF ACRONMY

AC: Alternating Current

ADC: Analog Digital Conversion

DC: Direct Current

LCD: liquid crystal display

RAM: Random Access Memory

ROM: Read Only Memory

CPU: Central Processing Unit

VRM: Voice Recognition Module

CMD: Command

WHO: World Health Organization

GSM: Global System for Mobile Communications

IDE: Integrated Development Environment

GPS: Global Positioning System

SMS: Short Message Service

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CHAPTER ONE: INTRODUCTION

1.1 BACKGROUND

Disability is a natural aspect of the human experience that arises from a complex interplay of health conditions and impairments, such as spinal cord injury, blindness, or dementia, with various contextual factors, such as societal attitudes, access to infrastructure, age, gender, and discriminatory policies. These factors create varying levels of disability, which can affect an individual's physical, mental, and social functioning, resulting in significant limitations in their daily lives. As such, disability should be understood and addressed within the broader social and environmental context in which it occurs.[1]

As of 2021, approximately 1.3 billion people – about 16% of the global population – have a disability. This number has increased substantially during the past decade due to different demographic and epidemiological changes such as population rising and the increase in the number of people with noncommunicable diseases, living longer and ageing with limitations in functioning.[2]. Trends influence patterns of disability in a particular country in health conditions and trends in the environment. The other factors include road traffic crashes, natural disasters, conflict, diet, and substance abuse.

In Uganda, according to the 2014 National Housing and Population Census1, 12.5% of the population have at least one disability, which is expected to increase due to ageing and chronic illness. Disability is, therefore, a significant source of vulnerability. For the population of Children with Disabilities (CWD), data remains scarce. An analysis on the situation of the rights of children with disabilities in Uganda estimates that 13% or approximately 2.5 million children live with some form of disability. The report points to significant gaps in the disaggregation of data by gender and types of disabilities and the overall inexistence of accurate national data.[3]

The National Household Survey 2005/2006 estimated that 7% of Uganda’s population had a disability. Physical impairments account for the highest form of disability (34%), followed by visual impairments (22%) and hearing difficulties (15%). Other impairments include mental, speech and learning disabilities.

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