

UNI

VERSITI

## THE 11TH INTERNATIONAL INNOVATION, INVENTION & DESIGN COMPETITION INDES 2022

# **EXTENDED ABSTRACTS BOOK**



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Perpustakaan Negara Malaysia

Cataloguing in Publication Data

No e-ISSN: e-ISSN 2756-8733



Cover Design : Nazirul Mubin Mohd Nor Typesetting : Wan Nurul Fatihah binti Wan Ismail

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## The 11th International Innovation, Invention and Design Competition 2022

Organised by

Office of Research, Industrial Linkages, Community & Alumni Networking (PJIM&A) Universiti Teknologi MARA Perak Branch

and

Academy of Language Study Universiti Teknologi MARA Perak Branch



## MY GUIDE SMART CANE FOR THE VISUALLY IMPAIRED PERSON INTEGRATED WITH GPS TRACKER, VOICE & VIBRATION ALERTS, AND 3-WAY SENSORS

Aklil Ebadi Harun, Farel Endy Fadlinazich, Rizqy Maulana, Ilham Rahmadi Biyyananda, Muhammad Saif Zubairi, Ahmad Mujtaba Arafa

SMP Progresif Bumi Shalawat

Email: bumi.labirin@gmail.com

## ABSTRACT

Blind individuals encounter difficulties related to the utilization of canes, notwithstanding the indispensable role played by these devices in facilitating orientation and mobility. Canes serve as practical implements that empower autonomous ambulation, even in light of the swift progress witnessed in technology and alternative assistive solutions. Thus, an innovative design of a cane, integrated with better technology is proposed in this study, namely My Guide to help the visually impaired with mobility. My Guide features a box-shaped design with various components which includes multiple sensors, a charging port, a small speaker, three potentiometer caps for adjusting sensor distance, and a water sensor to detect stagnant water, facilitating user mobility. Additionally, My Guide incorporates a GPS Tracker, enabling the user's close contacts to track their location. Furthermore, it is equipped with a voice recorder to enhance user monitoring in each environment. Through extensive sensor testing, all sensors performed well. Coupled with its affordable price, My Guide stick holds significant market potential, catering to a wide range of users.

Keywords: My Guide Smart Stick, Blind, GPS Tracker, 3 Way Sensor

### **1. INTRODUCTION**

Blind people are individuals who have physical limitations or are visually impaired, as a result of their sense of sight not functioning. In general, blind individuals have obstacles in communicating, and adapting the environment to themselves. These limitations may be an obstacle in carrying out developmental tasks (Harimukthi & Dewi, 2014). There are still many who think that only people with normal physical condition can feel technological progress, however, people with disabilities should also be able to experience the benefits of technological advancements too. For instance, individuals with visual impairments can navigate their surroundings with the aid of a technologically sophisticated walking cane. (Adri Achmad Farhan, 2015). "My Guide" is a tool created by students in Indonesia to help learners and the disability community, especially the visually impaired, in utilizing a tool that can help them interact with the surrounding environment. "My Guide" will be a new breakthrough for the disability community in Indonesia, which is an innovation of the younger generation, especially the progressive students of Bumi Shalawat in globalizing ideas and developing the nation after the pandemic to help people with disabilities in Indonesia.



## 2. METHODOLOGY



Figure 1 Stages of Designing My Guide

According to Figure 1, the first stage is the preparation of tools (drills, scissors, screwdrivers, etc.,) and materials (ultrasonic sensors, water sensors, etc). The next stage is designing hardware where images or design sketches were made before designing the tool. After that, the hardware was manufactured. The next stage is the perforation of the box, which is perforating several parts of the box to facilitate the installation of materials into the box. The next stage is assembling the material on the Printed Circuit Board (PCB) and installing several components onto the PCB. After assembling the PCB, a program to manage some of the functions of this tool was created. Then, the program was uploaded into this series of tools, so that the tool can function systematically. Furthermore, the materials that have been designed were put into the box. After finishing designing the tool, the last stage is testing the tool on the sample.

## **3. FINDINGS**



Figure 2 Final Designs of My Guide





Figure 3 My Guide Components

Symbol	Name	Functions					
Α	Arduino Nano	The main control that receives input and output from					
		other components, for example inputs, sensors, spacers,					
		push buttons, water sensor inputs from transistors,					
		while the output is the sound of the buzzer, vibration,					
		and sound.					
В	DF Player MP3	Voice record player stored in memory					
С	Sensor Ultrasonic HC-	Able to detect objects with a distance of 400cm or 4					
	SR04	meters, the range can be adjusted					
D	Potentiometer RV09	The ranger that the user wants, first reads which will be					
	10k ohm	sent to the Arduino Nano, the potentiometer reads the					
		values A1, A2 and A3 and then stored in memory					
Ε	Battery rechargeable	Power supply provider					
	lithium polymer						
	1000mAh						
F	Module charger	For charging in charging the battery					
	battery TP4056 Type						
	С						
G	Buzzer	It is used to convert electrical vibrations into sound					
		vibrations.					
Н	Vibrate module	Give off a vibration on the stick					



Ι	Resistor 1k ohm	<b>1k ohm</b> Arduino communication circuit with DF player				
J	<b>Resistor 10k ohm</b> Arduino communication circuit with DF player					
K	Push button	Read on or not in the tool				
L	Transistor NPN bc547 Read water whether there is a puddle or not					
Μ	Saklar	slar Function to turn on or turn off the tool				
Ν	Speaker	Makes default sound and can't be muted				
0	Socket audio stereo	For sound output, it can be left and right, if the user enters				
		the headset, the N speaker will automatically turn off, the				
		sound from the headset can be slowed down				
Р	Red and black wire	Connecting power that gets its power supply from the				
		battery and is passed on to all components				

## Table 1 Usage of My Guide's Components

The design of My Guide is illustrated in Figure 2. Figure 3 shows the front of this tool where a sensor is; on the left side there is a button to change modes, on and off buttons, a charge port, and a second sensor; on the back of the tool there is a small speaker as a sound output, while on the right side of the tool there is a third sensor. The top of this tool has three potentiometer caps to adjust the sensor distance and at the bottom of the stick there is a water sensor that functions to detect puddles to increase user safety and comfort. Table 1 explains the functions of each component in My Guide design. My Guide is equipped with a GPS Tracker that can be used to find out the My Guide user's real time location point, can record voice, listen to voice remotely, and is integrated with Google Maps. Researchers have tested My Guide tool, both indoors and outdoors, as shown in Table 2. The results obtained by researchers showed that all features and sensors on this device can function as expected, including the integrated GPS Tracker which can function to track the user's location, so their loved ones can track them for safety and security purposes, if needed.

Module Name	Function	Status
3-Way Sensor	Detects surrounding objects, from the front, right, and	Succeed
	left	
Water Sensor	Detects water	Succeed
GPS Tracker	Tracks user's location	Succeed
Buzzer	Converts electrical vibrations into sound vibrations	Succeed
Vibrate Module	Gives off a vibration on the stick	Succeed
Speaker	Makes default sound and can't be muted	Succeed
Socket Audio	For left and right sound output, if the user puts on a	Succeed
	headset, the N speaker will automatically turn off, the	
	sound from the headset can be slowed down	

Table 2	2 I	Result	of	Modul	e	Testing
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## 4. CONCLUSION

My Guide aims to help blind people in carrying out mobility and activities at home and in the social environment. By incorporating a GPS tracker within My Guide, it becomes possible to enhance feelings of satisfaction, security, and comfort. Consequently, the families of visually impaired individuals can actively monitor their loved ones and alleviate any concerns that may arise when they engage in outdoor activities. Not only that, but this tool is also equipped with 3 sensors to increase effectiveness in detecting surrounding objects, thus increasing the safety of the user. My Guide is equipped with several features, namely detection with language sounds, buzzer sounds, and vibrations and is equipped with a water sensor. The findings have successfully demonstrated that all the functions My Guide offers work well and answer the needs of the target group. The innovative cane designed for the visually impaired holds significant potential in transforming the lives of individuals within the disability community and by leveraging advanced technologies, it enhances independence, safety, and overall quality of life for visually impaired individuals, while also fostering inclusivity and empowering them to fully participate in society.

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