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COLLEGE OF ENGINEERING
NAAC Accredited Autonomous Institution
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ISO 9001:2015 & ISO 14001:2015 Certified Institution
Thalavapalayam, Karur – 639 113.

A Minor Project Report

on

SMART WHITECANE USING ARTIFITIAL INTELLIGENCE

Submitted in partial fulfilment of requirements for the award of the

Degree of

BACHELOR OF ENGINEERING

in

ELECTRONICS AND COMMUNICATION ENGINEERING

Under the guidance of

DR. S. JEGADEESAN

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M.KUMARASAMY COLLEGE OF ENGINEERING

(Autonomous)

KARUR – 639 113

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M.KUMARASAMY COLLEGE OF ENGINEERING, KARUR

BONAFIDE CERTIFICATE

Certified that this project report **"SMART WHITE CANE USING ARTIFICIAL INTELLIGENCE"** is the bonafide work of **"KEERTHI P (21BECO85), KIRUBASHINI P(21BEC089), MADHUMITHA SRI R (21BEC108)"** who carried out the project work under my supervision in the academic year 2022-2023.

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This project report has been submitted for the **18ECP103L-Minor Project I** Viva Voce Examination held at M. Kumarasamy College of Engineering, Karur on

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To emerge as a leader among the top institutions in the field of technicaleducation

Mission of the Institution

M1: Produce smart technocrats with empirical knowledge who can surmountthe global challenges

M2: Create a diverse, fully engaged, learner-centric campus environment toprovide quality education to the students

M3: Maintain mutually beneficial partnerships with our alumni, industry, andProfessional associations Vision of the Department

Vision of the Department

To empower the Electronics and Communication Engineering students with emerging technologies, professionalism, innovative research, and social responsibility.

Mission of the Department

M1: Attain the academic excellence through innovative teaching learningprocess, research areas & laboratories and Consultancy projects.

M2: Inculcate the students in problem solving and lifelong learning ability.

M3: Provide entrepreneurial skills and leadership qualities.

M4: Render the technical knowledge and skills of faculty members.

Program Educational Objectives (PEOs):

PEO1: Core Competence: Graduates will have a successful career in academia or industry associated with Electronics and Communication Engineering.

PEO2: Professionalism: Graduates will provide feasible solutions for the challenging problems through comprehensive research and innovation in the allied areas of Electronics and Communication Engineering.

PEO3: Lifelong Learning: Graduates will contribute to the social needs through lifelong learning, practicing professional ethics and leadership quality.

Program Outcomes (POs):

PO 1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO 2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO 3: Design/development of solutions: Design solutions for complex engineeringproblems and design system components or processes that meet the specified needswith appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO 4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO 5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO 6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues, and the consequent responsibilities relevant to the professional engineering practice.

PO 7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development

PO 8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO 9: Individual and teamwork: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO 10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO 11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO 12: Life-long learning: Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes (PSOs):

PSO1: Applying knowledge in various areas, like Electronics, Communications, Signal processing, VLSI, Embedded systems etc., in the design and implementationof Engineering application.

PSO2: Able to solve complex problems in Electronics and Communication Engineering with analytical and managerial skills either independently or in team using latest hardware and software tools to fulfil the industrial expectations.

ABSTRACT

A survey by WHO (World Health Organization) carried out in 2011 estimates that in the world, about 1% of the human population is visually impaired (about 70 million people) and amongst them, about 10% are fully blind (about 7 million people) and 90% (about 63 million people) with low vision. The main problem with blind people is how to navigate their way to wherever they want to go. Such people need assistance from others with good eyesight. As described by WHO, 10% of the visually impaired have no functional eyesight at all to help them move around without assistance and safely. This study proposes a new technique for designing a smart stick to help visually impaired people that will provide them navigation.

Abstract	**Matching with POs, PSOs**
keywords	Human population, visually impaired, fully blind, low vision, main problem, blind people, navigate, good eyesight, functional eyesight, without assistance, safely, new technique.

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LIST OF ABBREVATIONS

ACRONYM	ABBREVIATIONS
WHO	World Health Organization
IOT	Internet Of Things
GSM	Global System for Mobile communication
GPS	Global Positioning System

1. INTRODUCTION

The conventional and archaic navigation aids for persons with visual impairments are the walking cane (also called white cane or stick) and guide dogs which are characterized by a many imperfection. In today's world even the disabled people want to be independent and do not want to seek help from others. Smart Blind Stick is an innovative device, which is an initiative to help blind people to resolve the problems faced by them in their daily life. Smart Blind Stick is a system device which incorporates several features namely- obstacle detection and navigation. The most critical shortcomings of these aids include essential skills and training phase, range of motion, and very insignificant information communicated been communicated. Our approach modified this cane with some electronics components and sensors, the electronic aiding devices are designed to solve such issues.

Vision is the most important part of human physiology as 83% of information human being gets from the environment is via sight. The 2011 statistics by the World Health Organization (WHO) estimates that there are 70 million people in the world living with visual impairment, 7 million of which are blind and 63 million with low vision. Smart Blind Stick is a fully automated as well as manually operated, easy to maintain, cheap and comfortable to use device. It is an innovative device designed for visually disabled people for refined navigation and advanced obstacle detection. In this device, we propose advanced blind stick that allows visually challenged people to navigate with relieve using advanced technology. The conventional and oldest mobility aids for persons with visual impairments are characterized with many limitations. Some inventions also require a separate power supply or navigator which makes the user carry it in a bag every time they travel outdoor. These bulky designs will make the user to be exhausted.

Visually Impaired persons have difficulty to interact and feel their environment. They have little contact with surroundings. Physical movement is a challenge for visually impaired persons because it can become tricky to distinguish obstacles appearing in front of them, and they are not able to move from one place to another. They depend on their other for mobility and financial support. Their mobility opposes them from interacting with people and social activities. In the past, different systems are designed with limitations without a solid understanding of the no visual perception. Researchers have spent the decades to develop an intelligent and smart stick to assist and alert visually impaired persons from obstacles and give information about their location. Over the last decades, research has been conducted for new devices to design a good and reliable system for visually impaired persons to detect obstacles and warn them at danger places.

Smart walking stick is specially designed to detect obstacles which may help the blind to navigate care-free. This system presents a concept to provide a smart electronic aid for blind people, both in public and

private space. The proposed system contains the ultrasonic sensor, buzzer, vibrator. The Stick measures the distance between the objects and smart walking stick by using an ultrasonic sensor. This device is light in weight and portable. But its range is limited due to its own size. It provides the best travel aid for the person. The blind person can move from one place to another independently without the others help.

The main aim of the system is to provide an efficient navigation aid for the blind persons. Smart Blind Stick is a fully automated as well as manually operated, easy to maintain, cheap and comfortable to use device. It is an innovative device designed for visually disabled people for refined navigation and advanced obstacle detection. In this device, we propose advanced blind stick that allows visually challenged people to navigate with relieve using advanced technology.

2. LITERATURE REVIEW

Smart Electronic Stick for Visually Impaired Roopashree.B.S.Bindiya,PatilShruthi B.R Roopashree.2015.GPS and GSM are used to acquire the exact location of the blind person at times of emergency and send the coordinates to his relatives or caretaker. Design of Microcontroller based Virtual eye for the blind Pooja Shame's Simi S. L, Dr.S.Chatterji 2014.

The ultrasonic sensor is reflecting the waveform and this signal received from the barrier objects are used as inputs to Arduino microcontroller. A Survey of Voice Aided Electronic Stick for Visually Impaired People Gurubaran, Gowrishankar, Kasilingam, Mritha, Ramalingam,2014 Using GPS technique easy to identify the position and location of the blind person. Smart Cane for Visually Impaired Person by Using Arduino Ramesh Satpute, Mohsin Mansuri, Dnyaneshwar Kulkarni 2016 .

This is using 3 emergency button any problem blind people click the button the message sends the doctor or family members Automated Help aid for Visually Impaired People using Obstacle Detection and GPS Technology V. S. Kaushalya.

An economically viable product which used open source was the key element to developing our prototype. D. P Premarathne, H. M. Shadir P. Krithika, G.S. Fernando, 20163D Ultrasonic Stick for BlindOsama Bader AL-Barrm, Jeen VinouthJan 2014 System provide the information regarding the location of the blind person using the stick to his family members. Ultrasonic and Voice Based Walking Stick for Blind People D. Sekar, S.Sivakumar, P.Thiyagarajan, R.Premkumar, M. Vivek kumar&2016 In this system, ultrasonic sensor, temperature sensor, humidity sensor, GPS receiver, vibrator, voice synthesizer, speaker or headphone, PIC controller and battery are used.

A Survey of Voice Aided Electronic Stick for Visually Impaired People Gurubaran, Gowrishankar Kasilingam, Mritha Ramalingam&2014 For security purpose, thumb print scanner is used which activates the stick when the particular blind people access using their thumb prints.

Thus, this stick might not be misused by others God gifted sense of vision to the human being is an import life. But there are some u unfortunate people who lack the ability of visualizing things. Blind stick is an innovative stick designed for visually disabled people for improved navigation.

The paper presents a theoretical system concept to provide a smart ultrasonic aid for blind people. In this developed system is intended to provide overall measures – Artificial vision and object detection Ultrasonic sensors are used to calculate distance of the obstacles around the blind person. Output is in the form of sequence of beep sound which the blind person can hear.

In this system, ultrasonic sensor, temperature sensor, humidity sensor, GPS receiver, vibrator, voice synthesizer, speaker or headphone, PIC controller and battery are used. The APR9600 device is used in this project, and it offers true single-chip voice recording, non-volatile storage, and playback capability for 40 to 60 seconds. PIC16F887 microcontroller is used in this proposed project.

3. OBJECTIVES

Visually impaired people are the people who find it difficult to recognize the smallest detail with healthy eyes. The objectives of this research work include as follows:

1. To design an assistive technology for visually impaired people that can detect obstacles and provide alternative routes for the blind
2. To alarm the user through vibration to determine the obstacles direction sources
3. To help the user find his stick when he mistakenly loses it somewhere. Through this smart blind stick, visually impaired people will have so much of assistance.
4. In case of any problem, with the function of Global Positioning System (GPS), we can track their whereabouts.

4. COMPONENTS USED

- ARDUINO UNO
- GPS MODULE
- GSM MODULE
- ULTRASONIC SENSOR

5. HARDWARE DESCRIPTION

4.1 Arduino UNO

Arduino is an open-source microcontroller board. The Arduino Nano is a small, complete, and breadboard-friendly board based on the ATmega328P (Arduino UNO 3.x). The microcontroller on the board is programmed using Arduino software.

The boards are equipped with sets of digital and analogy input/output (I/O) pins that may be interfaced to various expansion boards or breadboards and other circuit. The Microcontrollers are typically programmed using a dialect of features from programming language C & C++. In addition to using traditional compiler tool chains, the Arduino project provides an integrated development environment (IDE) bases on the processing language project.

4.2 GPS Module

GPS (Global positioning System) is a satellite navigation system used to determine the ground position of an object. GPS technology was first used by the United States military in 1960s and expanded into civilian use over the next few decades. Today, GPS receiver are included in many commercial products, such as automobiles, Smartphone, exercise watches etc.

GPS system include 24 satellite deployed in space about 12000 miles (19300 kilometre) above the earth's surface. The orbit earth one every 12 hours at extremely fast pace of roughly 7000 miles per hour. The satellites are evenly spread so that satellites are accessible via direct line-of-sight anywhere on the globe. The navigation messages are broadcast at a rate of 50 bits per second. Utilizing this collocation of data, GPS receiver to generate position data.

4.3 GSM-Module

GSM (Global system for mobile communication) is a digital mobile telephony system that is widely used all over the world. A GSM module requires a SIM (Subscriber's identity module) card to be operated and operated over a network range subscribed by the network operated. It can be connected to an Arduino through cable or Bluetooth connection, GSM module can be communicated to PIC microcontroller using normal serial USART protocol.

4.4: Ultrasonic sensor

An ultrasonic sensor is a device that can measure the distance to an object by using sound waves. It measures distance by sending out a sound wave at a specific frequency and listening for that sound wave to bounce back. The ultrasonic transmitter an ultrasonic wave this wave travel in air and when it gets object by any material it gets reflected toward the sensor this reflected wave is observed by the ultrasonic receiver module.

The accuracy of ultrasonic sensor can be affected by temperature and humidity of the air it is being used. It operated in frequency in 40 Hz. It can measure the distance 2 cm to 80 cm. This sensor is very popular because multiple purpose application.

6. SOFTWARE DESCRIPTION

5.1 Arduino IDE

The Arduino integrated development environment (IDE) is a cross-platform application (for Windows, Mac OS and Linux) that is written in the programming language java. It is used and uploads programs to Arduino compatible boards.

The Arduino IDE supports the language C and C++ using special rules of codes structuring. The Arduino IDE supplies a software library from the wiring project which provides many common input and output input basic functions, for starting the sketch and the main program loop that are compiled and linked with a program

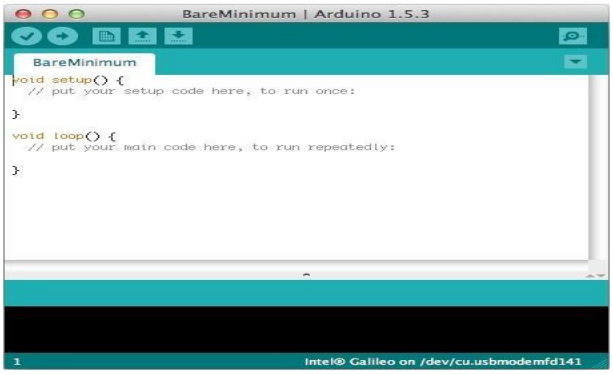


Fig 1.

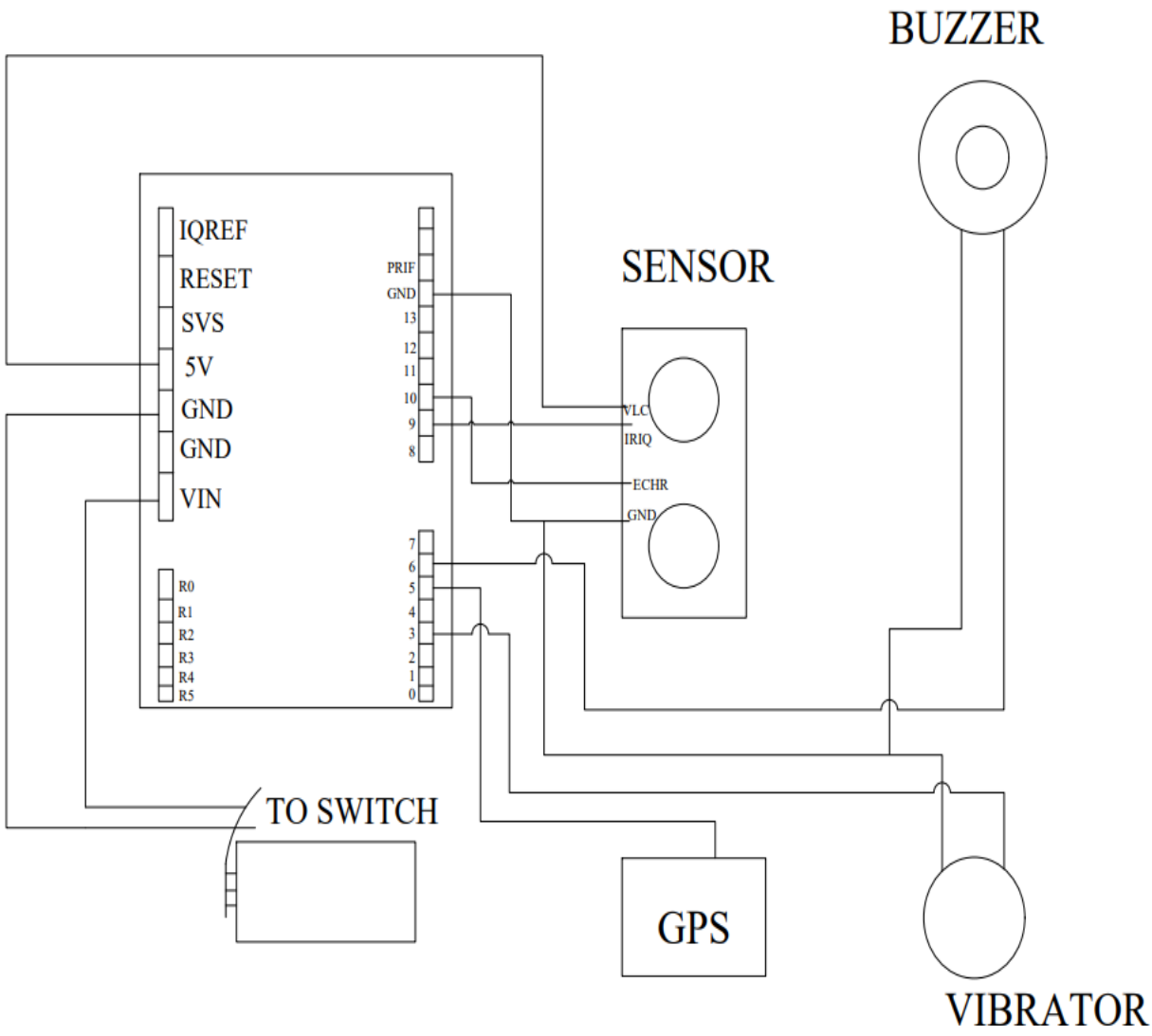
Arduino IDE is an open source that is mainly used for writing and compiling the code into the Arduino module. It is official software making code compilation too easy that even a common person with no prior technical knowledge can get their feet with the learning process. A different range of Arduino modules available including Arduino Uno, Arduino mega, Arduino Nano, and many more. Each of them consists of a microcontroller on the board that is programmed and accepts the information in the form of code. The IDE environment mainly contains two basic parts: Editor and compiler where former is used for writing the required code and later is used for compiling and uploading the code into the given Arduino module.

7. SOURCE CODE

```
      // defines pins numbers
const int trigPin = 7;
const int echoPin = 8;
const int buzzer = 10;
const int motorPin = 6;
long cm;
long duration;
int distance;
void setup() {
pinMode(trigPin, OUTPUT); //trigger pin
pinMode(echoPin, INPUT); //echo pin
pinMode(buzzer, OUTPUT); //buzz
pinMode(motorPin, OUTPUT); //vibrating motor
Serial.begin(9600);
}
void loop() {
digitalWrite(trigPin, LOW);
delayMicroseconds(2);
digitalWrite(trigPin, HIGH);
delayMicroseconds(10);
digitalWrite(trigPin, LOW);
duration = pulseIn(echoPin, HIGH);
distance= duration*0.034/2;
Serial.print("Distance:");
Serial.print(distance);
Serial.println(" cm");
delay(500);
if (duration <= 1000){
digitalWrite(buzzer, HIGH);
digitalWrite(motorPin, HIGH);
   }
  else {
```

```
digitalWrite(buzzer, LOW);
digitalWrite(motorPin, LOW);
}
}
```

8. CIRCUIT DIAGRAM



9. CIRCUIT DIAGRAM DESCRIPTION

The above figure shows the circuit diagram of Smart Blind Stick. We can see an Arduino Nano is used to control all the sensors. The complete board is powered by a 9V battery which is regulated to +5V. The First Ultrasonic Sensor is powered by 5V and the trigger1 and Echo1 pin is connected to Arduino Nano pin A1 and A0 as shown above. And second Ultrasonic Sensor is connected to the trigeer2 and eco 2 to the A2 and A3. The Rain sensor is power by the 5v in VCC and Gnd is grounded connected to A4**.** The output of the board is given by the Buzzer which is connected to pin 12.

For GPS Module (Global positing system) power by the 3v and Gnd is grounded, and Trigger is connected to the 8 pins of the Arduino Nano and Eco is connected to the 9 pins of the Arduino Nano. GSM (Global System for Mobile Communication) is powered by the 5V and Gnd is grounded Trigger is connected to the 6 pins of the Arduino Nano and Eco is connected to the 7 pin of the Arduino Nano.

10. ADVANTAGES & LIMITATIONS

Advantage of blind stick is listed below: -

1. This system consists of different type of the sensor, which is used to measure the distance and alert the blind people.
2. It is simple to use and is affordable.
3. This system can navigate the location of the blind people when they find themselves in danger or some adverse situations.
4. Smart blind stick is robust, and the stick is light, portable, and reliable.
5. It consumes low power which makes it feasible to use.

Limitations of blind stick are listed below

1. Pits and bumps of the road cannot be detected using this device.
2. As the sensor is sensitive, it should be handled in utmost care and prevented from contact with water.

11. APPLICATIONS

Facilitates the visually impaired people through various user-friendly features such as:

1. Obstacle alert

2. Communication.

12. CONCLUSION

It is worth mentioning at this point that the aim of the of this study is design and implementation of a smart walking stick for the blind has been fully achieved. The smart stick as a basic platform for the coming generation of more adding devices to help the visually impaired to navigate safely both indoor and outdoor. It is effective and affordable.

It leads the good result in detecting the obstacles on the path of the user in a range. This project offers low cost, reliable, portable, low power consumption and robust technology for navigation with obvious short response time. In this project, different types of sensors and other component with the light weight.

It also includes Global Positioning system (GPS) which is used to find the actual position of the blind person. And other function is Global system for mobile communication (GSM) module which help to send the location to their member in case the blind person gets lost or if they are in the danger. And the rain sensor is used to detect the water.

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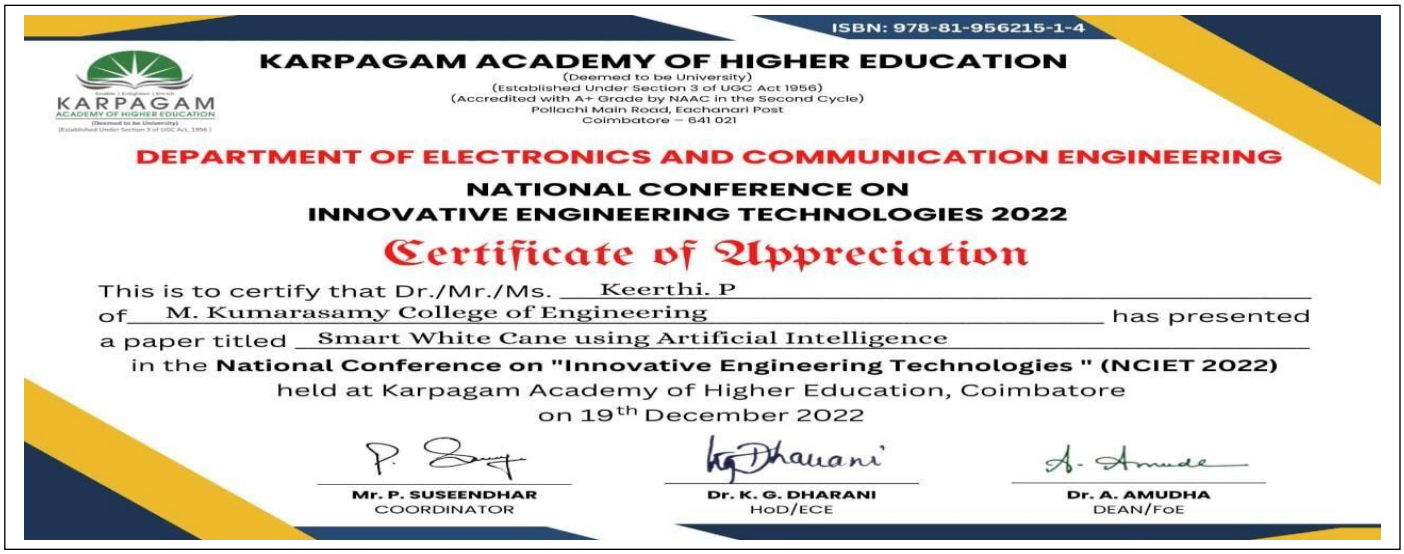

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NATIONAL CONFERENCE ON
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This is to certify that Dr./Mr./Ms. Keerthi. P
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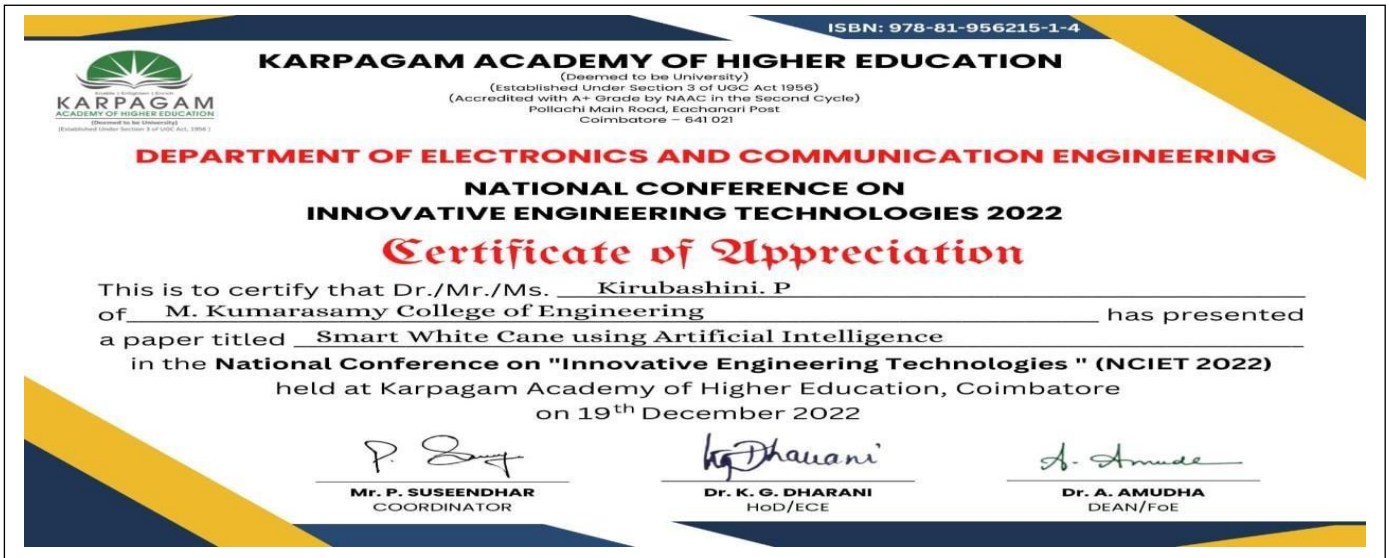

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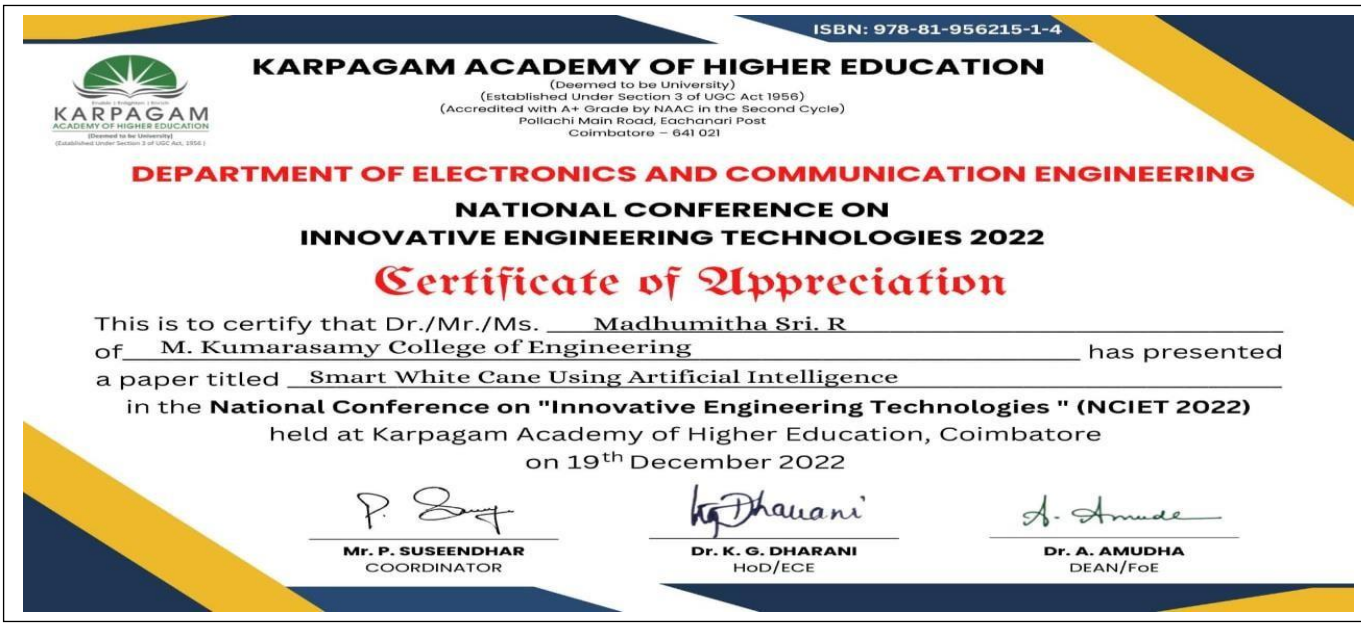

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