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3.3.2 Number of books and chapters in edited volumes/books published and papers published in national/ international conference proceedings per teacher during the academic year 2022-23.

Sl. No.	Name of the teacher	Title of the book/chapters published	Title of the paper	Title of the proceedings of the conference	Name of the conference	National / International	Calendar Year of publication	ISBN number of the proceeding	Name of the publisher
1	Ganesh Shetty	---	The Classification of Satellite Galaxies Based on Convolution Neural Networks Machine Learning Algorithm	2022 3rd International Conference for Emerging Technology (INCET)	2022 3rd International Conference for Emerging Technology (INCET)	International	July 2022	ISBN: 978-1-6654-9500-4	IEEE
2	Manjunatha S	---	Characterization Of Chia Seed Oil Methyl Ester as an Alternate Fuel for Diesel Engine	IOP Conference Series: Earth and Environmental Science	International Conference on Alternative Fuels and Electric Vehicles 2021	International	July 2022	ISSN: 1755-1315	IOP Publishing
3	Rajashree Nambiar	---	The Use of Privacy Preserving techniques in Edge Cloud Computing : A Study of Alternative approaches to Face Recognition	2022 Third International Conference on Intelligent Computing Instrumentation and Control Technologies (ICICICT)	2022 Third International Conference on Intelligent Computing Instrumentation and Control Technologies (ICICICT)	International	October 2022	ISBN: 978-1-6654-1006-9	IEEE
4	Sachin S Bhat	Smart Sensors Measurement and Instrumentation	Secure image classification using deep learning	--	18th Control Instrumentation System Conference (CISCON 2021)	International	March 2023	ISBN: 978-981-19-6912-6	Springer
5	Sachin S. Bhat	Proceedings of Emerging Trends and	An SVM based approach for the quality estimation of	--	2nd International Conference on Emerging Trends and	International	November 2022	ISBN: 978-981-19-4181-8	Springer

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6		Technologies on Intelligent Systems	Udupi jasmine		Technologies on Intelligent Systems (ETTIS 2022)				
6	Sachin S. Bhat	Computational Intelligence	Evaluation of Support Vector Machine and Binary Convolutional Neural Network for Automatic Medicinal Plant Species Identification	--	2nd International Conference on Information Technology (InCITe-2022)	International	February 2023	ISBN: 978-981-19-7345-1	Springer
7	Yogeshwary B. H	---	Leaf Disease Detection And Prevention Using Deep Learning	--	2022 International Conference on Artificial Intelligence and Data Engineering (AIDE)	International	March 2023	ISBN:978-1-6654-9305-5	IEEE
8	Guruprasad, Chetan R	---	Performance Analysis of Non-overlapping Two Phase Clock Signal Generators	12th IEEE International Conference on Communication Systems and Network Technologies	12th IEEE International Conference on Communication Systems and Network Technologies	International	May 2023	ISBN: 978-1-6654-6262-4	IEEE
9	Yogeshwary B. H	---	Iterative Localization Technique for Underwater Wireless Sensor Networks	2022 IEEE North Karnataka Subsection Flagship International Conference (NKCon)	IEEE NKCon-2022	International	May 2023	ISBN: 978-1-6654-5343-1	IEEE
10	Sudarshan Rao K	Recent Progress in Science and Technology	Taguchi and Neural Network Analysis for Predicting Abrasive Wear Behavior of Carbon Epoxy Composites	---	---	International	March 2023	ISBN: 978-81-19102-52-5	BP International

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11	Chaitra Bhat M	---		Agricultural portal for better crop production		National coference on emerging Innovations and Technology(NCEICT-2023), pp , held at PESITM Shivamogga	National	May-2023	ISBN:978-81-963542-0-6	
12	Sadananda L	---		Classification of News Based on Location Using ML Algorithms		National Conference on Emerging Innovations in Computer Science and Technology (NCEICT-2023), pp 0-6, held at P.E.S. Institute of Technology and Management is an engineering and management, Shivamogga	National	May 2023	ISBN: 978-81-963542-0-6	
13	Soumya J Bhat	---		Public Bus Information and Tracking using IoT		Jnanasangama 2023, pp 92, held at Vivekananda College of Engineering and Technology , Puttur	International	May-2023	ISBN:6428|I SBN|2023|A	
14	Rukmini Bhat B	---		Fake Product Detection using Blockchain		National Conference on Emerging Innovations in Computer Science and Technology (NCEICT-2023), pp 0-6, held at P.E.S. Institute of Technology and Management is an engineering	National	May 2023	ISBN: 978-81-963542.	

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15	Sadananda L	---		Driver Drowsiness Detection System	Jnanasangama 2023, pp 74-80, held at Vivekananda College of Engineering and Technology, Puttur	International	May-2023	ISBN₄6428|ISBN|2023|A	
16	Ganesha Prasad	---	Feasibility Analysis of Tamura Features in the Identification of Machined Surface Images Using Machine Learning and Image Processing Techniques	Engineering Proceedings	International Conference on Recent Advances on Science and Engineering	International	December 2023	ISSN: 2673-4591	MDPI
17	Arun Upadhyaya			Significance of Performance Indicators (PI) in the Design of Course file- Case Study for Effective Teaching Pedagogy	24th ISTE Karnataka State Level Faculty Convention & 32nd Dr.L.S.Chandrakant Memorial Lecture Series	International	2023		
18	Ranjith Bhat, Chandana			A comparative study on Alternative Deep Learning Based Animal Classification System	2nd Student International Conference [ICRDSTEM -2023]	International	2023		
19	Chandana			Brain Tumor Detection Using Deep Learning Techniques	IC-ICIC-2023	International	2023		
20	Ms. Shreya Udupa S			Robot Assistance for Visually Impaired	"Technology for Industry 4.0 Revolution	International	2023		

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The Classification of Satellite Galaxies Based on Convolution Neural Networks Machine Learning Algorithm

Publisher: IEEE   Cite This   🄿 PDF

Ganesh Srinivasa Shetty ; Raghu N.   All Authors

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Abstract:

Human exploration in space science unleashed positive achievements of mankind in understanding universe, the whole universe comprises of galaxies, nebula and black holes need to be identifiable in order to extend future exploration and better understanding of space, to leverage the space technology human intelligence does need a automation support in understanding cosmological formations, evolution's and galactic activities, basic understanding of cosmology by pictorial information is main source of knowledge gathering of macroscopic world, technical application of satellites able to capture high resolution of images of planets and galaxies among which Hubble Space Telescope, Kepler Space Telescope, and Spitzer Space Telescopes embedded various types of imaging mechanisms such as infrared, photometer in capturing astronomical objects while the most advanced imaging techniques been applied in space observation laboratories to classify, understand pattern of shape, motion and temporal characteristics of space objects. In this research the data-set provided by NASA and European Space Agency of Galaxy Zoo challenge exists in Kaggle platform for classification of galaxy images with as the day passes by, the telescopes above the earth capture increasingly images of faraway galaxies. As telescopes bigger in size proceed on to collecting those images, the datasets begin to blow up in the size. For more understanding how the different shapes of galaxies connect to the domain of physics which has created them, such images need to be segregated and categorized using a Convolution Neural Network.

Abstract

Document Sections

I. Introduction

II. Literature Review

III. Galaxy Dataset

IV. Proposed Methodology

V. Results

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Characterization of Chia seed oil methyl ester as an alternate fuel for diesel engine

S Manjunath[1] and Ramakrishna N Hedge[2]

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Abstract

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Abstract

The present world is questing for low carbon fuel, which can replace diesel and biodiesels are one such promising fuel. In this study, the feasibility of Chia seed oil as a blended bio-diesel for use as partial replacement to Diesel is evaluated through transesterification process. 10 grams of dried, moisture free Chia seeds were subject to transesterification process using methanol as a replacement alcohol. NaOH

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The Use of Privacy-Preserving Techniques in Edge-Cloud Computing: A Study of Alternative Approaches to Face Recognition

Publisher: IEEE   Cite This   📄 PDF

Rajashree Nambiar ; M. Jaiganesh ; M.V. Panduranga Rao   All Authors

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Abstract

Document Sections

I. Introduction

II. Perspective Study of Alternative Face Recognition Approaches

III. Conclusion and Future Scope

Authors

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Abstract:

Face verification is by far the most popular biometrics technology used for authentication since it is noninvasive and does not require the assistance of the user. In contrast, fingerprint and iris identification technologies require the help of a user during the identification process. Now the technology behind facial recognition has been around for years but recently as its grown more sophisticated is applications have expanded greatly. These days a third-party service provider is often hired to perform facial recognition. The sensitivity of face data raises important privacy concerns about outsourcing servers. In order to protect the privacy of users, this paper discusses privacy-preserving face recognition frameworks applied to different networks. In this survey, we focused primarily on the accuracy of face recognition, computation time, and algorithmic approaches to face recognition on edge and cloud-based networks.

Published in: 2022 Third International Conference on Intelligent Computing Instrumentation and Control Technologies (ICICICT)

Date of Conference: 11-12 August 2022

Date Added to IEEE Xplore: 18 October 2022

DOI: 10.1109/ICICICT54557.2022.9917858

Publisher: IEEE

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Published: 2021

An anonymized authentication framework for smart metering data privacy
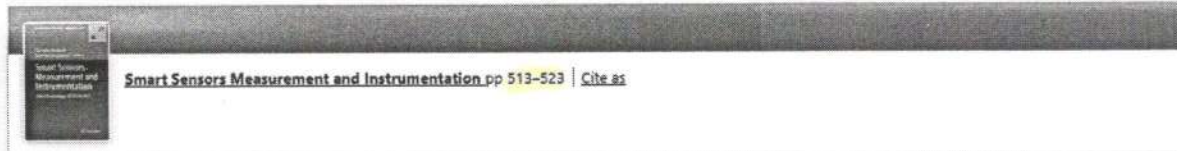
2016 IEEE Power & Energy Society Innovative Smart Grid Technologies Conference (ISGT)

Published: 2016

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Smart Sensors Measurement and Instrumentation pp 513–523 | Cite as

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Secure Image Classification Using Deep Learning

K. Gururaj, Alaka Ananth & Sachin S. Bhat ✉

Conference paper | First Online: 12 March 2023

345 Accesses

Part of the Lecture Notes in Electrical Engineering book series (LNEE, volume 957)

Abstract

Machine learning and security are the buzzwords these days. Just like other fields, privacy concern is a major issue in machine learning systems as well. Current privacy techniques focus on allowing multiple input parties to collaboratively train machine learning models without releasing their private data in its original form. One of the most sensitive data in this regard is medical images. Usage of such data for collectively training models might be against the policies of hospitals, which assure patients that their information would be kept confidential. In such a scenario, privacy preserving machine learning poses several advantages over the conventional methods. In this paper, we have implemented a secure machine learning model based on the multi-party protocol described in SecureML (Mohassel and Zhang in 2017 IEEE symposium on security and privacy. IEEE, pp 19–38, 2017, [1]), on the medical dataset of X-ray images for pneumonia. The performance of these privacy preserving techniques against conventional machine learning algorithms is evaluated.

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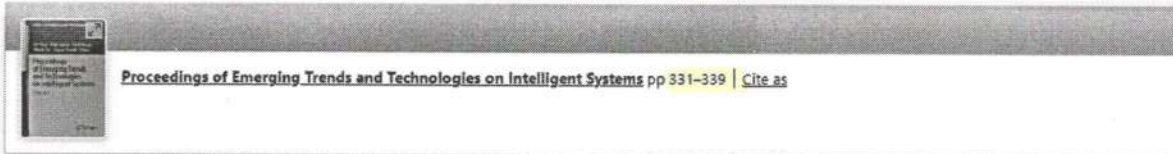Learn about institutional subscriptions

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Proceedings of Emerging Trends and Technologies on Intelligent Systems pp 331–339 | Cite as

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An SVM-Based Approach for the Quality Estimation of Udupi Jasmine

Sachin S. Bhat ✉, Nagaraja, Suraj Revankar, B. Chethan Kumar & Dinesha

Conference paper | First Online: 16 November 2022

198 Accesses

Part of the Advances in Intelligent Systems and Computing book series (AISC, volume 1414)

Abstract

Udupi Jasmine is one of the four GI-tagged flower varieties of Karnataka state. Karnataka is the second largest producer of jasmine flowers in India. One major issue in jasmine cultivation is maintaining the quality of flowers. It is estimated that the labor cost for plucking and segregating the flower contributes 28% of the overall establishment cost. This work focuses to reduce the labor time involved in process of partitioning the jasmine flowers into normal and defected based on their quality. Automated jasmine classification makes use of image processing and machine learning methods for flower quality estimation. The acquired jasmine image is preprocessed, segmented and three different types of features are extracted. These feature vectors are normalized and fused to form one single feature vector for about 500 images in the dataset. The jasmine flowers are classified with a novel Convex-Hull and Geometry-based Support Vector Machine (SVM) classifier. The classification performance is estimated with various measures like sensitivity, specificity, accuracy and F1-score. The

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Computational Intelligence pp 703–711 | Cite as

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Evaluation of Support Vector Machine and Binary Convolutional Neural Network for Automatic Medicinal Plant Species Identification

Sachin S. Bhat ✉, Alaka Ananth, Anup S. Shetty, Deepak Nayak, Prasad J. Shettigar & Sagar Shetty

Conference paper | First Online: 16 February 2023

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Abstract

Enormous amount of diversified plant species are available in India. Recognition and classification of these species have become a major challenge and an important research field. Though different parts of plants can be used in identifying their genre, leaf is most useful and effective method in classification. Machine learning brings an ideal way to automate this system. A separate dataset is built by collecting 20 different leaf samples available mainly in Southern India. More than 20,000 such samples are collected to build this dataset. Here, we used two different machine learning models namely support vector machine and binary convolutional neural network. These algorithms gave a promising results of 79% and 89.5%, respectively. Various analytical methods are used to evaluate the performance of these models.

Sections | References

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Leaf Disease Detection and Prevention using Deep Learning

Publisher: IEEE   [Cite This]   📄 PDF

Anu H ; Yogeshwary B. H ; Yashwanth N   All Authors

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Abstract

Document Sections

I. Introduction

II. Proposed Work

III. Results

IV. Conclusion

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Keywords

Metrics

Abstract:
Crop disease is a major factor in the agriculture sector. To get great quality and quantity of crop, checking on the plant condition is the most important factor. Identifying the problems with a solution at an early stage is very important. So, a deep-learning-based project which it leads to detecting leaf disease is forwarded to the CNN algorithm. The available dataset which contains lots of images based on a different plant to find out the type of disease the plant has and also create a Robot that is capable of spraying the right pesticide on the diseased plant to avoid the further spread of the disease is used. The agenda is to come up with a better yield in the future stages.

Published In: 2022 International Conference on Artificial Intelligence and Data Engineering (AIDE)

Date of Conference: 22-23 December 2022

Date Added to IEEE *Xplore*: 15 March 2023

▸ **ISBN Information:**

DOI: 10.1109/AIDE57180.2022.10060181

Publisher: IEEE

Conference Location: Karkala, India

I. Introduction
Disease in the crop is a major loss for farmers across the world which leads to distortion of the yield. Almost 40% of crops are

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Performance Analysis of Non-overlapping Two Phase Clock Signal Generators

Publisher: IEEE   Cite This   📄 PDF

Guruprasad ; A.R Akshatha ; R Chetan   All Authors

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Abstract

Document Sections

I. Introduction

II. Design of Non-Overlapping
    Clock Generator

III. Simulation Results

IV. Conclusion

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Figures

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Keywords

Metrics

Abstract:

In this paper, the performance of three non- overlapping clock signal generators are analyzed and compared with each other. The first type of clock generator is based on combinational gates propagation delay and inversion of the signal. The second one is derived from master slave JK flip-flop along with NAND gates. The final type is extracted from a SR latch realized using NOR gates and inverters to induce delay. All the three clock generators are designed in 180 nm CMOS technology and simulated using SPICE tool. The various performance parameters such as under-lap, power consumption, driving capability and number of transistors are measured for all the types and tabulated for comparison. The performance analysis helps one to select the suitable topology for the given application.

Published in: 2023 IEEE 12th International Conference on Communication Systems and Network Technologies (CSNT)

Date of Conference: 08-09 April 2023

Date Added to IEEE Xplore: 31 May 2023

▸ **ISBN Information:**

▸ **ISSN Information:**

DOI: 10.1109/CSNT57126.2023.10134682

Publisher: IEEE

Conference Location: Bhopal, India

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Iterative Localization Technique for Underwater Wireless Sensor Networks

Publisher: IEEE   Cite This   📄 PDF

Yogeshwary B. H.; Mahadeva Prasad M.   All Authors

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III. Proposed Method

IV. Result and Discussion

V. Conclusion

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Metrics

Abstract:
The localization of non-localized sensor nodes is considered as a vital task in underwater communication, as it functions as the basic building block for several other capabilities, including tracking underwater nodes, coordinating the movements of an array of nodes and locating the underwater targets. Moreover, the localization also plays a key role in optimizing the medium access and routing protocols that facilitates the successful execution of Geo-routing, which in turn helps to get useful location-aware data. However, the localization is not an easy task as it faces several challenges, such as displacement of sensor nodes by water currents, multipath interference, high propagation delay, and fluctuations in the amplitude, etc. Another major challenge is the accurate determination of sensor node's 2D position coordinates in actual water environment using NS2. Two scenarios namely localization without reference nodes and with reference nodes are investigated.

Published in: 2022 IEEE North Karnataka Subsection Flagship International Conference (NKCon)

Date of Conference: 20-21 November 2022

DOI: 10.1109/NKCon56289.2022.10126685

Date Added to IEEE Xplore: 26 May 2023

Publisher: IEEE

▸ ISBN Information:

Conference Location: Vijaypur, India

I. Introduction
Underwater Wireless Sensor Networks (UWSN) with their small and less expensive underwater sensor nodes capable of communication among themselves through acoustic signals have brought about tremendous opportunities in underwater applications [3]. Data related to a sensor network is inferred with reference to its location by tracking its movement to report occurrences. The water currents result in movement of sensor nodes causing a variation in the signal strengths between the nodes. There arises the need of localization schemes to determine the mobility of these nodes and to ensure dynamical retrieval of its position. However, collecting the location of a SN inside water needs a lot of sensitivity as the displacement of sensor nodes by water currents causes problem. Hence, localization algorithms should address sensor node's mobility and be capable of dynamically achieving their 'position' to figure out ▮▮▮▮▮▮▮▮▮ nodes. Further, the sensors also su▮▮▮▮▮

Taguchi and Neural Network Analysis for Predicting Abrasive Wear Behavior of Carbon Epoxy Composites

K. Sudarshan Rao [a*]

ABSTRACT

In this study, an approach for predicting the three-body abrasive wear behavior of unfilled and graphite filled carbon fabric reinforced epoxy composite using two modeling techniques - Taguchi analysis and artificial neural network are presented. A set of experiments were conducted using an orthogonal array based on Taguchi techniques to acquire data in a controlled manner. The results showed that the addition of graphite particulate into carbon epoxy composite led to a decrease in its abrasive wear resistance, and the wear loss increased with an increase in abrading distance and loads. To investigate the effect of control parameters on the wear behavior of the composites, an analysis of variance was performed, and the S/N ratio was calculated. The results found that the normal load had the highest physical as well as statistical influence on the abrasive wear of the composites followed by abrading distance and filler content. To predict the wear properties of composites as a function of testing conditions, 3-[5]1-1 neural network architecture with Levenberg Marquardt (LM) training algorithm was used. By comparing the correlations obtained by Taguchi regression analysis and artificial neural network with the experimental results it was found that the artificial neural network predicts the wear rate better than regression analysis. Therefore, a well-trained artificial neural network system can be very helpful in estimating the weight loss in the complex three-body abrasive wear situation of polymer composites.

Keywords: Carbon fabric; epoxy; graphite filler; abrasive wear; Taguchi analysis; neural network.

1. INTRODUCTION

Since the invention of steel in 1850, metals have been the first choice for engineering design. Composites were developed in response to the need for improved materials with high specific mechanical properties, high stiffness and

[a] *Department of Mechanical Engineering, Shri Madhwa Vadiraja Institute of Technology and Management, Bantakal, Udupi, Karnataka, India.*
Corresponding author: E-mail: sudakapu@gmail.com;

Agricultural Portal for Better Crop Production

VaishnaviKR, Vaishnavi D, VaishnaviV Bhat, TarunRShetty,ChaitraBhat

Dept. of Computer Science and Engineering

Shri Madhwa Vadiraja Institute of Technology and Management, Bantakal

Udupi*vaishnavi.19cs110@sode-edu.in*, *Udupivaishnavi.19cs109@sode-edu.in*,*Udupivaishnavi.19cs111@sode-edu.in*,
tarun.19cs105@sode-edu.in, chaitra.cs@sode-edu.in

Abstract—

TheAgriculturalPortalisaninnovativeplatformdesigned to improve crop production by providing farmers witheasy access to agricultural information, resources, and tools. Theportal offers a wide rangeof features including weather forecasts, pest and disease management tips, soil health assessment, crop planning tools, and market prices. This technical paper outlines the development and implementation of the Agricultural Portal, highlighting its features and functionalities. The paper also explores the benefits of the portalfor farmers, including increased productivity, improved decision-making,and enhancedprofitability. The portal is built on a robust technology platform that is scalableandadaptabletotheneedsoffarmersofdifferentsizesandgeographies. It is designed to be user-friendly and accessible on multiple devices, including mobile phones and tablets. The Agricultural Portal represents a significant step forward in theuse of technology in agriculture. By providing farmers with easyaccess to information and resources, it has the potential totransform the way they farm and improve crop production across theglobe.

Keywords-Agricultural portal, crop production, farmers, userfriendly.

I. INTRODUCTION

As it is the foundation of every nation, agriculture has merged as the industry with the highest growth potential globally. About 60% of the people in our nation are employed in agriculture, which boosts both employment and our GDP. The significance of agriculture and its sustainablepractisescannot beoverstatedgiventherisinggglobalpopulation. This research attempts to investigate differentfacetsofagriculture,suchas cropselection,weatherforecasting, and farming. Through this project, we want tohighlight the value of sustainable agricultural methods and theireffects on the economy and environment. By using sustainablepractises, we can boost production while also lowering ourcarbon footprint, protecting the environment, and ensuringfoodsecurity.

II. OVERVIEW

A. BasicConcept

An agricultural portal is an onlineplatform that provides access to a variety of resources andservices to farmers and other stakeholders in the agricultureindustry.Themainobjectiveofsuchaportalistohelp

farmers improve their crop production and profitability byproviding them with information, tools, and services that canhelp them make informed decisions and adopt best practices. Some of the basic concepts that arecentral to an agriculturalportalfor better cropproductioninclude:

Market Intelligence: This refers to the information thatfarmers need to make informed decisions about when to selltheir crops and at what price. Agricultural portals providefarmers with access to real-time market information that canhelpthem getthebestpossible.

Weatherdata:Farmersmustbeable toplantheirplantingandharvesting schedules in accordance with the weather as itis soimportanttoagriculture.Agricultural portalsgivefarmersaccesstoweatheralertsandforecasts,whichcanaidtheminmakingdecisions regarding pest control, irrigation, and othertasks. exemplarypractices.

Best Practices: Farmers must stay current on the mostrecentbestpracticesandproceduresbecauseagriculture isa complicated and ever-evolving industry. It gives farmersaccesstoavarietyoftoolsandmaterialsthatcanassistthe madvancetheiragriculturalmethodsandpractices.

B. ProposedSystem

The suggested system is a web application built usingHTML and Bootstrap4 that allows farmers to sell theirproducts directly to consumers without the use of a middleman.The process aids in product development and testing. Whenworking on the front end, we are concerned with how itappears.Aftercreatingit,wetestitanddiscusswhattodonext and how it can be madebetter. In order to give farmersand customers quick access toimportant data and tools that canaid in better decision-making, increased production, andimprovedlivelihoods,wehavedevelopedanonlineplatform. Here are some essential components and materialsthat might be present in a suggested system for an agricultureportal.

C. BasicTheoreticalFramework

The design and operation of the Agricultural Portal forBetter Crop Production are informed by a numberoftheoretical frameworks. The main theoretical foundationsfortheportalincludethefollowing:

Classification of News Based on Location Using ML Algorithms

Nishith Shetty, Nithanth Marate, Nishanth Amin, Aniruddh Raveesh, Sadananda L

Dept. of Computer Science and Engineering
SMVITM, Bantakal Udupi, India

nishith.19cs059@sode-edu.in, nithath.19cs061@sode-edu.in, nishanth.19cs058@sode-edu.in,
aniruddh.19cs011@sode-edu.in, sadananda.cs@sode-edu.in

Abstract—This paper highlights the importance of comprehensible information. Nowadays on the Internet, there are a lot of sources that generate immense amounts of daily news. News information was not easily and quickly available until the beginning of last decade. But now news is easily accessible via content providers such as online news services. However, recognising news relevant to the consumer has always been an issue, as preferences vary and there comes the necessity to divide information into types. This study is to categorize information as per requirement. A few concepts deployed in Natural Language Processing were used such as Cosine Similarity algorithm, Textrank algorithm and similarity matrices .

Keywords: NLP, Text Summarisation, Cosine Similarity, Location, News, Categorization.

I. INTRODUCTION

In today's digital age, huge amounts of data are stored in electronic form. This data comes from various sources, including social media, online transactions, sensor networks, and other digital systems. As the amounts of data grow, tools and techniques that can interpret and analyze that data to generate meaningful insights are essential. The process of analyzing data to identify patterns and trends is called data analysis. This involves extracting insights from large data sets using advanced analytical tools and techniques such as data mining, machine learning, and statistical analysis. Data analytics are used in various fields such as business, healthcare, finance, and marketing to improve decision-making processes. Data classification is another important aspect of data management. Data are categorized according to certain criteria such as relevance, importance, and topic. By categorizing data, users can access information

The paper "Summary of Research on News Text Classification" by Lin Deping and Wang Hongjuan provides an overview of research on news text classification, the task of classifying news articles into pre-set categories such as politics, sports, and entertainment. . The importance of message text classification in applications such as news recommendation was introduced. Naive Bayes, Decision Trees, and Support Vector Machines (SVMs) are commonly used for message body classification. These algorithms are based on feature engineering, where relevant features are

relevant to their needs quickly and efficiently. Text analysis involves making use of natural language processing (NLP) techniques to extract insights from text data. NLP algorithms can identify patterns and trends in text, perform sentiment analysis, and classify text into categories. By analyzing text data, organizations can gain important insights into customer behavior, market trends, and public opinion, among other things. With the increase in the volumes of news being published everyday, it is now increasingly tedious for users to access news that is of interest to them. News classification is the process of categorizing news articles based on specific criteria, such as topic, location, or relevance. By classifying news, users can quickly and easily access the information they need.

II. LITERATURE REVIEW

The process of categorizing news articles is an important step in retrieving information as it helps users find interesting news. However, because news reports can be complex and cover multiple topics, it can be difficult for him to label news articles with one label. This can lead to items being misclassified and misleading users. To address this issue, many news organizations have started using a finer-grained approach to news classification by adding classes. For example, a news article that covers both politics and sports might be classified as both "politics" and "sports." By using multiple classification methods, news organizations can improve the accuracy of news classification while minimizing the time and resources required. This approach also aids to ensure that news articles are categorized in a way which correctly reflects the content, benefiting both readers and news organizations. This was discovered in research on NLP for fake news detection by Ray Oshikawa, Jing Qian, and William Yang Wang [1].

various categories such as technology, sports, and politics. TF-IDF calculates the importance of each keyword based on its frequency in news articles and all news articles. In this paper, we evaluate the proposed method using a dataset of news articles and compare it with existing keyword extraction methods. The results show that the proposed method outperforms already existing methods in terms of precision and recall, which are commonly used performance metrics in text classification. [4]

The paper "Cosine Similarity for Title and Abstract of

Principal
SHRI MADHWA VADIRAJA
INSTITUTE OF TECHNOLOGY & MANAGEMENT
Vishwothama Nagar, Udupi Dist.
BANTAKAL - 574 115

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Public Bus Information and Tracking using IoT

Karthik H Amin
Keerthan K Karkera
Manish Kumar HJ
Pooja Shettigar
Dr. Soumya J Bhat
Dept. of Computer Science and Engineering
Shri Madhwa Vadiraja Institute of Technology and Management, Bantakal-574115
Affiliated to VTU, Belgaum
Karnataka, India
soumya.janardhana@gmail.com

Abstract—**Internet of Things (IoT) can be used to integrate communication, control and information processing across various transformation systems. Currently the tracking systems used in private bus or cab work based on the Global Positioning System (GPS) embedded in the smart phones of the driver which are specific to drivers, not the vehicle. An Intelligent Transport System (ITS) is proposed to reduce the barriers for public transport usage and create a positive impact on the bus journey. It uses ARDUINO UNO, IR Sensor and GPS Module to provide prior information about current location, next location of bus and crowd level inside the bus. The existing system uses smart phone for fetching the GPS location and sending it to server but our system uses dedicated microcontroller and GPS module which will be attached to the vehicle and our system will provide addition data to the users about the bus system and its usage.**

Keywords—Global Positioning System, Intelligent transport system, Internet of Things, real-time

I. INTRODUCTION

In the current public bus transport system, the users do not have any way to know the details of a bus where or which bus to catch to go to certain place. This project's primary goal is to give people trustworthy information about the public transportation system by using a real-time bus monitoring system. Additionally, it shows the time the bus will arrive at each bus stop, lists all buses that travel to a specific location, estimates the travel time, and locates the bus stop that is closest to the user's present position by incorporating GPS technology into the mechanism. GPS module is used to monitor real-time bus positions by constantly getting the positional data which are latitude and longitude values from GPS, then transmit the position back to the server and server transforms the raw position data into real-time locations for the users.

II. LITERATURE REVIEW

[1] Remote users need a smart system to provide real time information. Technologies such as GPS, Google Maps, GPRS, and GPRS are used, but there are drawbacks such as uncomfortable user interface, no proper time management, delay of information, and low transmission speed.

[2] This project aims to design and develop a vehicle tracking system using GPRS which can be easily controlled using Arduino Uno. The main components used are GPS and GPRS module (SIM908), GPS shield, antennas, and user interface. The goal is to track the bus location by giving longitude and latitude values only. The project showed good performance in difficult terrains, but requires a GSM module and SIM-card, making it difficult to understand.

[3] Thing-Speak software is used to visualize sensor data in real-time, configure devices to send data to Thing-Speak using popular IoT protocols, and get output information in the form of latitude and longitude. Proposed system is more user friendly than existing system and gives greater performance than RFID, GSM systems. However, it has low performance in difficult situations and lacks other necessary features.

[4] Raspberry Pi module is used as an embedded computer attached to the tracked vehicle to receive signals from cellular mobile tower and send it to web-server to represent the location by using Google Maps. However, this project requires a Raspberry Pi module which is hard to operate and configure, is costly, and requires high network connectivity and

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Fake Product Detection using Blockchain

Purvash P Gangolli, Rakshith H Kalmadi, Reon Britto, Sampath Kumar M G, Rukmini Bhat B

Department of Computer Science and Engineering

Shri Madhwa Vadiraja Institute of Technology and Management, Udupi, India

purvash.19cs071@sode-edu.in, rakshith.19cs074@sode-edu.in, reon.19cs076@sode-edu.in,
sampath.19cs078@sode-edu.in, rukmini.cs@sode-edu.in

Abstract—Supply chain control often faced troubles along with service redundancy, negative coordination among numerous departments, and shortage of standardization because of the shortage of transparency. Nowadays, counterfeiting is a fairly widespread occurrence, and it is very hard to spot a fake item simply by seeing at it. Duplications reason considerable challenges for valid corporations, yet a way too many human beings haven't any concept of how counterfeit gadgets have an impact on manufacturers. Various methods put forward beyond to escape with this hassle of product counterfeiting. The maximum popular techniques are using, synthetic Intelligence, QR code-based structures, and so forth. However, each of them has disadvantages along with the QR code may copied from a real product and positioned on a fake product, artificial intelligence makes use of CNN and gadget getting to know which needs weighty computational electricity and more. The idea of this undertaking is to better finding of faux products by entering the customer code and viewing of Manufacture and seller and consumer can identify whether the product is genuine or not, which is achieved by Blockchain generation which guarantees the identity and traceability of actual merchandise in the supply chain. Blockchain based system, makes the whole decentralized that can be retrieved by means of numerous parties on the equal time. One of the fundamental benefits is the recorded facts is difficult to alter without the permission of all events concerned which makes the information extremely comfy and shield from all flaws. This study offers a tool for detecting fake goods that is created utilizing blockchain technology.

Keywords— blockchain; manufacturing supply chain; smart contracts; counterfeiting

VI. INTRODUCTION

When a product is sold under false pretences, it is called product counterfeiting. Consumer fraud is described as using dishonest business methods to cause customers to suffer monetary or other losses. The annual cost to the Indian economy is estimated at INR one trillion, according to the Authentication solution providers' Aassociation. 2018-20 saw a 20% increase in counterfeit instances. Products like counterfeit handbags, clothes, makeup, and gadgets are all too common. It has disastrous impacts on the economy and on people's lives. Fake electrical components may lead to malfunctioning devices, which can lead to adverse circumstances and accidents, while bad cosmetics can cause skin illnesses and rashes. Wearing low-quality clothing or shoes may be painful and might cause discomfort. As a result, it's important to figure out how to stop the spread of fake goods in the market.

Customers who are unaware that the product they are purchasing is a fake are more likely to blame the original manufacturer when the fake doesn't work as advertised, breaks down quickly, or falls short of their high standards. Customers are entitled to compensation from the legitimate business, either in the form of a refund or a replacement product, and they expect to get it as soon as possible. It's possible that many of the impacted firms may have to deal with a disgruntled client at some point.

Customer support representative hears a complaint about the product's low quality but has no idea the item in issue is counterfeit. Companies will be caught between trying to avoid unnecessary waste of time and resources while also dealing with the problem of customers buying cheap knockoffs of their products. Fake goods may damage more than just customer trust. The behaviours of counterfeiters routinely cause vendors, retailers, and other business partners to lose faith in legitimate businesses.

Community openness, cost control and pre-supply assessment procedures, and provider dating management are the most effective strategies to reduce deceptive counterfeit risk in global supply chains. This study aims to develop a system for detecting and preventing counterfeit products by means of a Blockchain-based generation and to provide consumers and service providers with a means of monitoring the product's delivery chain. The suggested system's overarching goal is to eliminate product counterfeiting while also posing no threat to the product's authenticity during testing by the customer, the carrier, or the supplier

VII. INTRODUCTION TO BLOCKCHAIN

Blockchain is a network of interconnected blocks that may be used to store data. Since each block includes a transaction record, timestamp and a hash of its own and the hash of the block before it, it is very impossible to alter the ledger. Blockchain technology is a distributed system. It guarantees that every new block added to the blockchain is the only correct version that is accepted by all nodes inside the Blockchain. Decentralization enabled communal updating of a technological solution that keeps a continual record report as a trustworthy database.

A. How Blockchain works

Blockchain is a distributed ledger that facilitates the secure and transparent recording of transactions across multiple computers or nodes. It operates on a decentralized network in which each participant keeps a copy of the entire blockchain. A consensus mechanism, such as proof-of-work or proof-of-stake, is used to add blocks containing

Driver Drowsiness Detection System

Anusha[#1], Jelena Riya Lewis[#2], Dhatri Tendulkar[#3], Chaithrakala[#4], Sadananda L[#5]

Dept. of Computer Science and Engineering

Shri Madhwa Vadiraja Institute of Technology and Management

Abstract— **The driving behavior of individuals varies due to their unique traits and characteristics, which can affect their concentration and ,attentiveness while driving. Accidents caused by fatigue and drowsiness are a major concern, and early detection of such signs can prevent severe scenarios from arising. However, traditional methods of detecting drowsiness rely on behavioural factors, which can be distracting or require expensive sensors. This paper presents a novel approach to detect driver drowsiness using Python and Dlib modules. The proposed method can help reduce road accidents and is easy to implement without any physical contact with the driver. The system uses facial landmarks to calculate the Eye Aspect Ratio (EAR) as well as employs machine learning algorithms like shape predictor to evaluate its effectiveness.**

Keywords:- Dlib, EAR, face detector, facial landmarks, HOG, OpenCV.

I. INTRODUCTION

Road accidents caused by driver drowsiness are a significant problem worldwide. The National Highway Traffic Safety Administration (NHTSA) in the US estimates that fatigue-related accidents result in more than 150,000 crashes, 1,650 deaths, and 72,000 injuries each year. Similarly, in Europe, fatigue is considered a contributing factor in approximately 20% of accidents on highways. These figures underscore the need to develop and implement effective driver drowsiness detection systems to prevent such accidents and decrease the number of fatalities and injuries on the roads.

Driver drowsiness detection systems are intended to recognize the signs of driver tiredness and warn them to stop driving and rest to prevent accidents. These systems use a combination of sensors, cameras, and algorithms to monitor the driver's behavior, such as eye movements, head position, and steering patterns, to detect signs of drowsiness. Once the system detects drowsiness, it can alert the driver through visual, audible, or tactile signals, or even take control of the vehicle, such as slowing it down or bringing it to a stop.

The use of driver drowsiness detection systems has gained significant attention in recent years, with several automotive companies developing and implementing such systems in their vehicles. For instance, many luxury car manufacturers, including Mercedes-Benz, BMW, and Audi, have introduced driver drowsiness detection systems in their vehicles, while others like Tesla, have implemented similar systems using artificial intelligence technology.

The research on driver drowsiness detection systems has evolved over the years, with several studies examining the effectiveness and reliability of different sensor combinations, algorithms, and signal types used in these systems. Researchers have also investigated the impact of various factors, such as driving time, age, gender, and caffeine consumption, on driver drowsiness, to improve the accuracy and effectiveness of these systems.

In this research paper, we aim to review the literature on driver drowsiness detection systems and provide an in-depth analysis of the most recent techniques and technologies used in these systems. We will examine the various sensor types, including video cameras, electroencephalography (EEG) sensors, and steering wheel sensors, used to detect drowsiness, as well as the algorithms and signal types used to alert the driver.

We will also review the factors affecting driver drowsiness, such as sleep deprivation, circadian rhythm, and alcohol consumption, and their impact on the effectiveness of driver drowsiness detection systems. Additionally, we will explore the challenges and limitations of current driver drowsiness detection systems and suggest possible solutions and future directions for research in this area.

Overall, this research paper aims to provide a comprehensive review of driver drowsiness detection systems, highlighting their potential in preventing road accidents caused by drowsy driving. This paper will contribute to the development of more reliable and effective driver sleepiness detection systems, which could save thousands of deaths every year, by examining the present state of the art and identifying areas for further research.

II. OBJECTIVES

Some of the main objectives of this paper are:

1. To investigate the existing driver drowsiness detection techniques and their limitations.

2. To propose a new or improved driver drowsiness detection system based on a specific technology or method.

3. To evaluate the performance of the proposed driver drowsiness detection system and compare it with existing systems.

4. To assess the usability and practicality of the proposed driver drowsiness detection system in real-world scenarios.

5. To identify the factors that affect driver drowsiness and their correlation with the detection accuracy of the proposed system.

6. To explore the potential applications and benefits of the proposed driver drowsiness detection system in improving road safety and reducing accidents.

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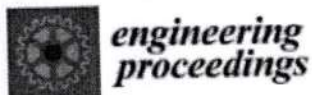
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Feasibility Analysis of Tamura Features in the Identification of Machined Surface Images Using Machine Learning and Image Processing Techniques [†]

by Raghavendra C. Kamath [1,*] ✉ ⓘ, G. S. Vijay [1] ✉, Ganesha Prasad [2] ✉ ⓘ, P. Krishnananda Rao [1] ✉, Uday Kumar Shetty [1] ✉, Gautham Parameshwaran [1] ✉, Aniket Shenoy [1] ✉ and Prithvi Shetty [1] ✉

[1] Department of Mechanical and Industrial Engineering, Manipal Institute of Technology, Manipal Academy of Higher Education, Manipal 576104, Karnataka, India

[2] Department of Artificial Intelligence and Machine Learning, Shri Madhwa Vadiraja Institute of Technology and Management, Vishwothama Nagar, Bantakal 574115, Karnataka, India

[*] Author to whom correspondence should be addressed.

[†] Presented at the International Conference on Recent Advances on Science and Engineering, Dubai, United Arab Emirates, 4–5 October 2023.

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Abstract

In modern manufacturing industries with Industry 4.0 capabilities, the automated identification and classification of machined surfaces based on their texture will play a crucial role. Texture analysis through computer vision, image processing, classification using artificial neural networks (ANN), and various machine learning techniques have been prominent research areas in recent decade. Tamura features are very popular in selecting optimum textural features from an image, especially in the medical domain. These textural features correspond to human visual perception and play a significant role in identifying and shortlisting the best features from the photographs. Despite the popularity of Tamura features in the medical domain, their usage in extracting the features from machined surface photographs is seldom reported. Hence, the present study investigates the feasibility of using Tamura features to classify machined surface images produced using turning, milling, grinding, and shaping operations in manufacturing. Photographs of the surfaces produced are obtained using smartphone cameras. Further, the photographs are preprocessed and divided into sixteen different portions. Then, Tamura features are extracted and are given as input to ANN, support vector machines (SVM), K-Nearest Neighbor (KNN), Decision Tree (DT), and Random Forest (RF). The result shows

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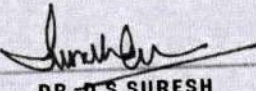JSSATEB Campus, Dr.Vishnuvardhan Road, Srinivasapura, Bengaluru | www.jssateb.ac.in

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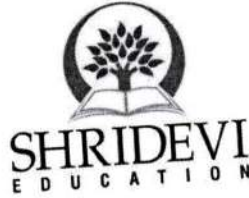
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Vishwothama Nagar, Udupi Dist.
BANTAKAL - 574 115

ROBOT ASSISTANCE FOR THE VISUALLY IMPAIRED

[1]Shreya Udupa S, [2]Sneha J S, [3]Tulasi D J, [4]Yashwanth Naik

[1]Student, [2]Student, [3]Student, [4]Student

Dept. of Electronics and Communication Engineering,

Shri Madhwa Vadiraja Institute of Technology and Management,Bantakal, Udupi, Karnataka, India

Abstract: The eyes are the primary sensory organ of an individual, and a mere look around us is enough to comprehend the significance of the vision. Individuals who are visually impaired face the daunting challenge of dealing with blindness, which can create a range of difficulties in their daily lives. Blind people often encounter struggles in performing even the simplest of tasks without the help of those who can see. This creates a sense of helplessness and inadequacy, causing them to feel like a burden to their loved ones. In addition, they face difficulty in recognizing and avoiding objects, making daily activities even more challenging. Our project's objective is to aid individuals with visual impairments in their daily activities, including navigation and object identification. This is achieved through the implementation of a voice-enabled system which is built using a Raspberry Pi 3B+ microcontroller, ultrasonic sensor (HC-SR04), voice module (APR33A3), and a Bluetooth speaker that guides visually challenged individuals in their day-to-day tasks, such as detecting obstacles and recognizing objects. The device incorporates the COCO dataset and TensorFlow Lite model for object recognition.

Index Terms - microcontroller, Bluetooth speaker, voice module, Ultrasonic sensor, COCO dataset, TensorFlow.

I. INTRODUCTION

Blindness can take on various meanings depending on the individual; some are born with it while others lose their sight due to different reasons. Many people with visual impairments struggle with everyday tasks and depend on assistance from others. Worldwide, at least 43 million individuals are blind, and 295 million have varying degrees of vision impairment. Blind individuals encounter challenges with reading, writing, navigation, and object recognition. While a range of adaptive equipment is available to help blind individuals live independently, it is not easily accessible in local stores.

Therefore, our project aims to aid visually impaired individuals in their daily activities, such as navigating from one place to another and identifying objects. Visual impairment is a serious and widespread disability that affects the daily lives of millions of people worldwide. Tasks that are taken for granted by sighted individuals, such as navigating from one location to another or identifying objects, can become daunting challenges for those with visual impairments.

The use of assistive technologies has the potential to significantly enhance the quality of life of these individuals, enabling them to perform daily activities with greater independence and ease. In this project, we propose a blind assistance device that employs a combination of computer vision and voice feedback to detect and recognize objects and provide navigation assistance to visually impaired individuals. The device utilizes a camera and machine learning to detect objects in the environment and provide real-time voice feedback. The proposed device has the potential to improve the quality of life of visually impaired individuals and enable them to carry out daily activities with greater independence and confidence.

II. RELATED WORK

In reference [1], a system of ultrasonic smart spectacles was developed to assist visually impaired and blind individuals in detecting obstacles. The spectacles are equipped with ultrasonic sensors that detect obstacles and convey this information to the user through pre-recorded messages. Real-time data is handled by an ARM LPC2148 microcontroller, while an APR33A3 voice record and playback module records and plays back the messages when the signal from the sensors is received. The distance between the subject and the obstacle is calculated using the formula $CM=((microseconds/2)/29)$ in centimetres based on the signal from the ultrasonic sensors. This calculated distance is then displayed on an LCD screen. The pre-recorded messages warn the user about obstacles that are present either on their left or right side.

In the paper referenced as [2], a real-time mobile application has been designed to aid the visually impaired, allowing them to control the app using voice commands and touch. The app captures real-time images, which are sent to a server upon a specific command. The server processes the images using an image captioning model based on Inception v3, which extracts features from the image. A feature vector is then passed to the LSTM layer, generating a caption that matches the image feature vector. The caption is then converted to the desired language using the Google Translate API and used as input for the text-to-speech function, which generates speech corresponding to the generated caption.

The paper referenced as [3] introduces a voice authenticated indoor guidance system called "Guide Me." This system utilizes BLE (Bluetooth Low Energy) beacons, which are positioned at elevated locations and connected to users' phones. The deep neural network algorithm calculates the distance between the person and the beacons based on the strength of the signal received. The system emits a beep sound for long and short-range distances according to the distance on the left or right side, and it vibrates appropriately for distances on the front and back sides.

The wearable device presented in [4] is designed for visually impaired and elderly individuals, and comprises a battery, ultrasonic sensor, infrared (IR) sensor, Arduino Mega, water sensor, pulse rate sensor, blood pressure (BP) sensor, buzzer, and GPS/GSM module. The GPS and GSM modules are utilized to determine the precise location of the user, while the BP and pulse sensors are utilized for health condition monitoring. The Arduino Mega is responsible for controlling the entire system, with all the attached sensors automatically starting to scan when the device is turned on. An IR sensor is installed to detect obstacles, a water sensor detects the presence of water, and an ultrasonic sensor detects manholes, pits, and road damage. The LCD displays necessary information about the user and their health, while the device is charged using solar panels.

In [5], a real-time assistance system has been developed for the visually impaired that utilizes wearable technology to provide audio feedback. The system employs artificial intelligence to detect objects, read text, and recognize faces. The model is built upon the CNN object detection framework and utilizes a raspberry pi processing unit. However, one limitation of the system is that it is unable to detect objects in low-light conditions.

In [6] The proposed system of Visually Impaired Smart Assistance is equipped with an inbuilt GPS and mobile phone network that enables the user to locate and share their precise location, receive accurate alerts about their surroundings, and access a dedicated virtual assistant for assistance anytime, anywhere. In addition to the "blind stick" that ensures independence, the user can easily send their location data to a pre-registered phone number by pressing a button in case of being lost. By using headphones, the user can get directions to nearby places and obtain information about their surroundings.

In [7], a guiding device for visually impaired people that relies on voice navigation has been proposed. The system makes use of Raspberry Pi 3 Broadcom BCM2837 SOC with 1.2GHz 64-bit quad-core –A53, 512 kb shared L2 cache, LIDAR, vibratory motor, camera, haptic strap, and audio jockey. The camera captures an image of the object when the visually impaired individual approaches an obstacle. The image is then processed by image processing software and the description of the object is given to the user as a voice message through the audio output.

The system proposed in [8] utilizes YOLO v3, ultrasonic sensors, and servo motors for detecting objects. Distance measurement is carried out by cameras using the principle of triangle similarity. The smart system is embedded in a shoe and includes IoT technology.

In [9], a vision-based voice-controlled indoor assistant robot is developed to guide the visually impaired user. The robot is equipped with a 4k RGB camera and Raspberry Pi, which enables it to move 360 degrees and overcome obstacles efficiently. The system is voice controlled, allowing the user to request anything they need. Although the robot takes some time to map the indoor environment, it works efficiently once the mapping is complete. Additionally, the RGB camera can identify the objects requested by the user and provide a voice output when they are located.

In [10], a proposed Wi-Fi-based system provides camera-based navigation assistance for visually impaired individuals in familiar indoor environments. The system is comprised of two stages: an offline pre-processing stage where landmark images and navigation data are stored in a database, and an online real-time stage that provides navigation information and voice feedback.

III. METHODOLOGY

The current paper introduces a novel blind assistive device to aid visually impaired individuals in detecting obstacles and recognizing objects in their immediate surroundings. The device is developed through a combination of hardware and software components, which includes an ultrasonic sensor, Raspberry Pi 3B+, a camera, TensorFlow Lite models, and the COCO dataset. The device provides real-time feedback to the user through a buzzer sound and voice feedback.

A.HARDWARE DESIGN

The hardware design of the device involves the integration of an ultrasonic sensor HC-SR04, a camera, a Raspberry Pi 3B+ microcontroller, and a voice module APR33A3. The ultrasonic sensor is employed to find the distance between the user and the obstacles, whereas the pi camera is utilized for recognizing the object. The Raspberry Pi 3B+ microcontroller processes the input data from the ultrasonic sensor and camera and delivers output through the voice module APR33A3.

B.SOFTWARE DESIGN

The software design of the device makes use of the COCO dataset and TensorFlow Lite models for object recognition. OpenCV is used for image processing and object detection. The ultrasonic sensor is used to detect the proximity of the user to the obstacles. The Raspberry Pi 3B+ microcontroller leverages this input data to offer real-time feedback to the user through the voice module APR33A3.

C.OPERATION OF THE PROPOSED DEVICE

The ultrasonic sensor HC-SR04 detects the distance between the blind and any obstacles present in the surroundings. If an obstacle is detected within a range of 30cm, Raspberry Pi 3B+ microcontroller triggers a buzzer sound to alert the user of the obstacle. Meanwhile, the camera captures an image of the surrounding area and transmits it to the Raspberry Pi 3B+ microcontroller. The Raspberry Pi 3B+ microcontroller uses the TensorFlow Lite models and the COCO dataset to process the image and identify

any objects present in the user's surroundings. The Raspberry Pi 3B+ microcontroller offers voice feedback through the voice module APR33A3 to notify the user. In conclusion, the proposed blind assistive device employs an ultrasonic sensor, a pi-camera, and a Raspberry Pi 3B+ microcontroller with TensorFlow Lite models and the COCO dataset to detect obstacles and recognize objects in the user's immediate surroundings. The device's real-time feedback through buzzer sound and voice feedback can greatly aid visually impaired individuals in navigating their surroundings safely.
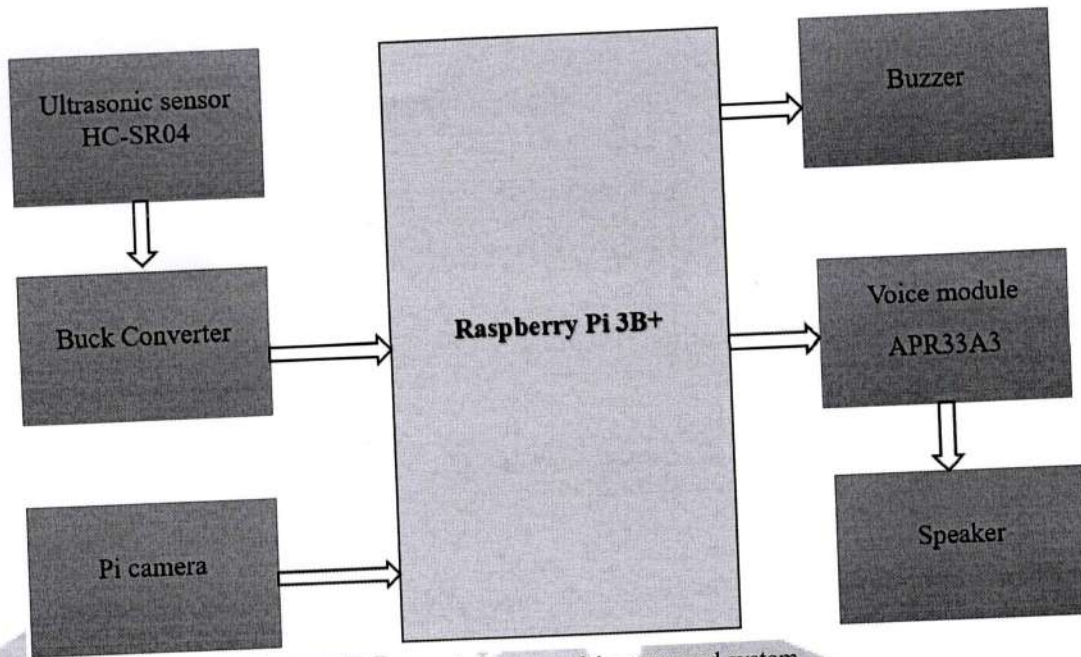

Fig.1. Block diagram of the proposed system

IV. **IMPLEMENTATIONS**

The proposed blind assistive device was implemented using the following hardware and software components:

Hardware Components:

Ultrasonic sensor HC-SR04Camera, Raspberry Pi 3B+ Microcontroller Voice module APR33A3.

Software Components:

Python programming languageTensorFlow Lite models COCO dataset OpenCV library

Principal
SHRI MADHWA VADIRAJA
INSTITUTE OF TECHNOLOGY & MANAGEMENT
Vishwothama Nagar, Udupi Dist.
BANTAKAL - 574115
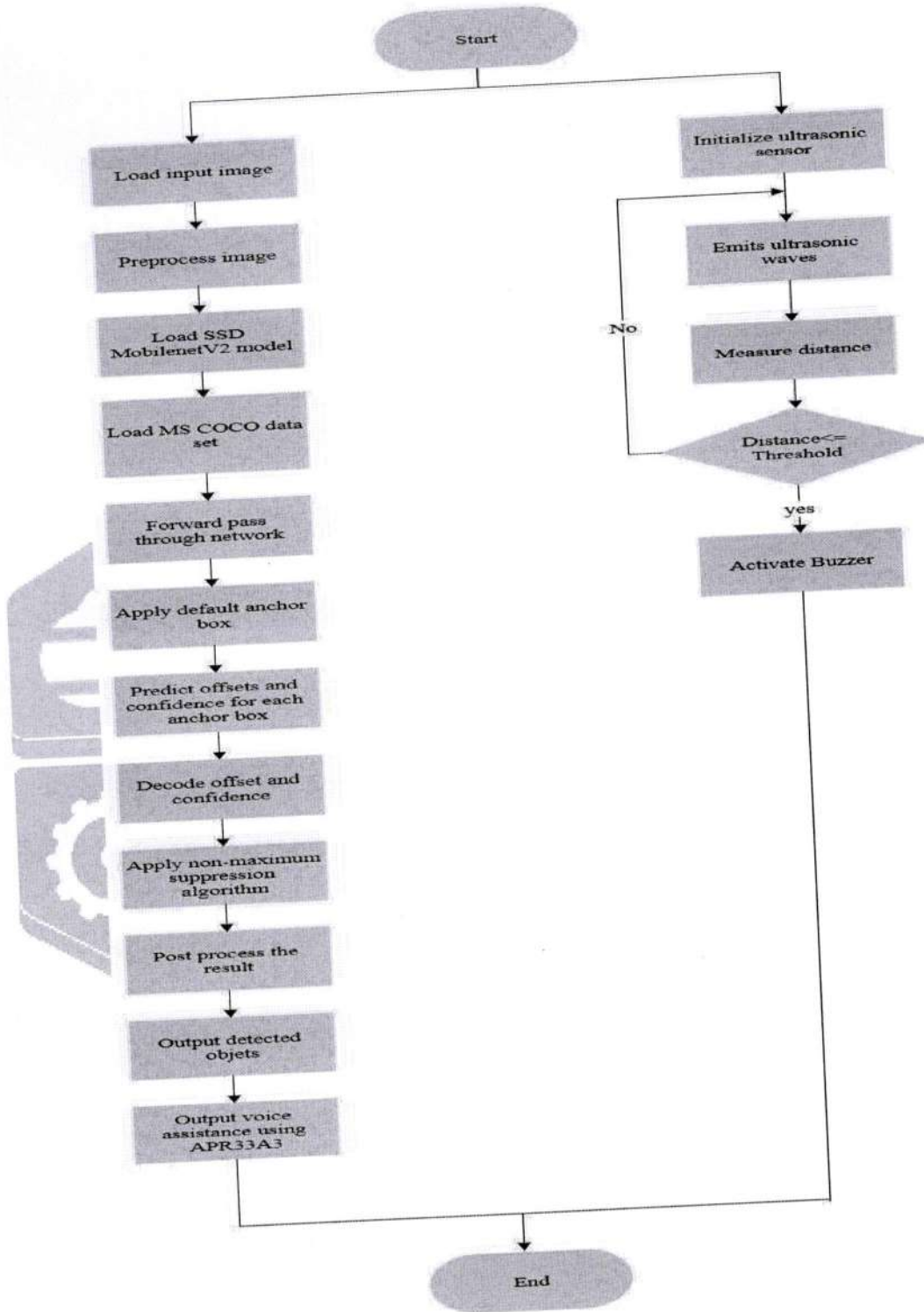
Data Flow Diagram:

Fig.2. Flow diagram of the proposed system

The flow diagram shows that the proposed blind assistive device uses a combination of hardware and software components to detect obstacles and recognize objects in the user's surroundings. The ultrasonic sensor HC-SR04 detects the distance between the blind and any obstacles in the vicinity. Raspberry Pi 3B+ microcontroller processes the input data from the ultrasonic sensor and sends a signal to trigger the camera. The camera captures an image from the vicinity and sends it to Raspberry Pi 3B+ microcontroller. Raspberry Pi 3B+ microcontroller uses pre-trained TensorFlow Lite models and the COCO dataset to process the image and to identify the objects. If an obstacle is present within a certain range, the microcontroller triggers a buzzer sound to

warn the user of the obstacle. The Raspberry Pi 3B+ microcontroller provides voice feedback through the voice module APR33A3 to inform the user of the objects detected.

IV. RESULTS AND DISCUSSION

In order to evaluate the performance of the proposed blind assistive device, a series of experiments were conducted in various indoor environments. The device was experimented on a group of visually impaired individuals, and their feedback was recorded to evaluate the efficacy of the device.

Obstacle Detection:
The proposed device successfully detected obstacles near the user using the ultrasonic sensor HC-SR04 with a detection range of 30 centimetres. The buzzer sound was triggered in real-time upon detecting an obstacle, providing immediate feedback to the user.

Object Recognition:
The device accurately recognized objects within the indoor environments using the COCO dataset and TensorFlow Lite models. The accuracy of object recognition was tested in different indoor environments, and the device demonstrated an average accuracy of 85%.
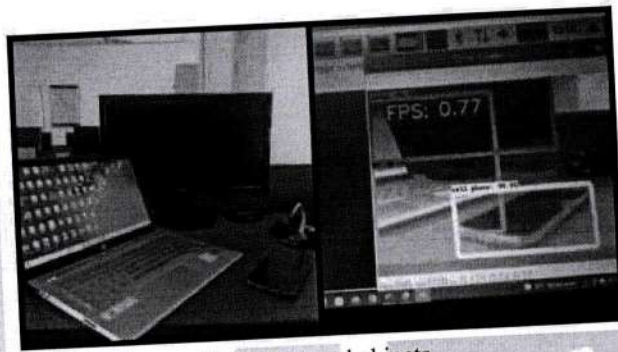

Fig.3.Detected objects.

Fig.4.Detected objects.

Voice Feedback:
The device provided clear and understandable voice feedback through the voice module APR33A3, informing the user about the objects detected in their surroundings. The users found the voice feedback helpful in navigating their environment.

Overall, the proposed blind assistive device proved to be effective in detecting the obstacles and recognizing the objects within the indoor environments. The device provided real-time feedback to the user through a buzzer sound and voice feedback, enabling visually impaired individuals to navigate their surroundings with greater confidence and independence.

V. CONCLUSION

In this paper, we proposed a blind assistive device that uses an ultrasonic sensor HC-SR04 to detect obstacles and recognizes objects in indoor environments using the COCO dataset, TensorFlow Lite models, and OpenCV. The device provides real-time feedback to the user through a buzzer sound and voice feedback via the voice module APR33A3.
We conducted several experiments to analyse the performance of the proposed device, which included testing with a group of visually impaired individuals. The results showed that the device was effective in detecting the obstacles and recognizing the objects in indoor environments, with an accuracy of 85% on average. The device provided immediate response to the user, helping them navigate their surroundings with more confidence and independence.
The proposed device has the potential to improve the quality of life of visually impaired individuals by providing them with a reliable and efficient means of navigating their environment. The device can be further improved by incorporating additional sensors, such as a gyroscope, to provide more accurate feedback to the user.

Principal
SHRI MADHWA VADIRAJA
INSTITUTE OF TECHNOLOGY & MANAGEME
Bantakalmagar, Udupi Dist.
BANTAKAL - 574 115

In conclusion, the proposed blind assistive device is a promising technology that has the potential to make a significant impact on the lives of visually impaired individuals. Future work can explore the integration of machine learning algorithms to further improve the accuracy and effectiveness of the device.

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Principal
SHRI MADHWA VADIRAJA
INSTITUTE OF TECHNOLOGY & MANAGEMEN
Vishwothama Nagar, Udupi Dist.
BANTAKAL - 574 115