SMART ASSISTIVE SYSTEM FOR VISUALLY CHALLENGED PEOPLE WITH EMERGENCY ASSISTANCE

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Keywords:

Raspberry-Pi, Raspberry Camera, Arduino Uno, Ultrasonic Sensor, GSM and GPS.

Introduction:

The Smart Assistive System for Visually Challenged Individuals with Emergency Assistance leveraging the Raspberry Pi module heralds a groundbreaking era in technological innovation aimed at enhancing the lives of those with visual impairments. This pioneering system matches the versatility and computational power of the Raspberry Pi with a dedicated focus on addressing the specific needs of visually Challenged individuals providing regular assistance as well as critical emergency assistance.

By seamlessly integrating into daily routines, the Smart Assistive System for Visually Impaired Individuals provides real-time assistance in various situations from navigating complex environments to offering vital support during emergencies. Whether indoors or outdoors, this innovative system is tailored to offer guidance provide pertinent information and most importantly swiftly summon aid during critical moments. Incorporating state-of-the-art sensors, artificial intelligence and intuitive interfaces. This system stands as a beacon of hope and reliability for the visually impaired community. Its primary objective is to enhance independence while ensuring swift and efficient emergency response when needed most.

Harnessing the compact yet formidable capabilities of the Raspberry Pi module, this system represents a remarkable convergence of hardware and software designed to serve as a reliable aid for individuals navigating the challenges posed by visual impairment. By leveraging this highly adaptable platform this system can accommodate a multitude of sensory inputs, computational tasks and communication protocols offering a holistic approach to assistive technology.

Objectives:

- **Object detection:** Ultrasonic sensor and Raspberry camera which is called as object detection sensor is used to avoid the collision between the objects and the blind person to make the blind person more convenient to move independently.
- **Voice feedback upon object detection:** To give notification about the presence of an obstacle a voice alert is produced through speaker by voice playback module in order to avoid the collision between the blind person and obstacles.
- **Location finding and emergency unit:** Emergency switch has to be implemented to send location SMS to the predefined number using GSM and GPS module in order to save the blind person from danger. The entire system is designed to be small and easy to use hence it should be cost effective.

Methodology:

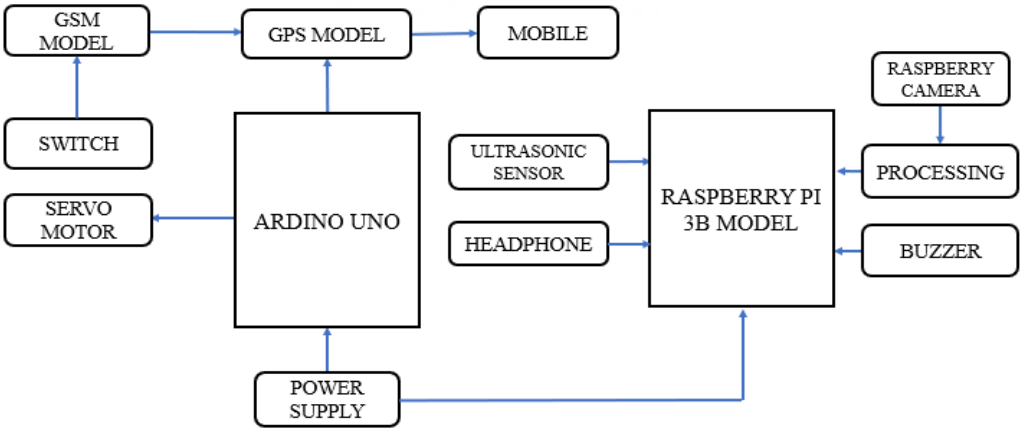
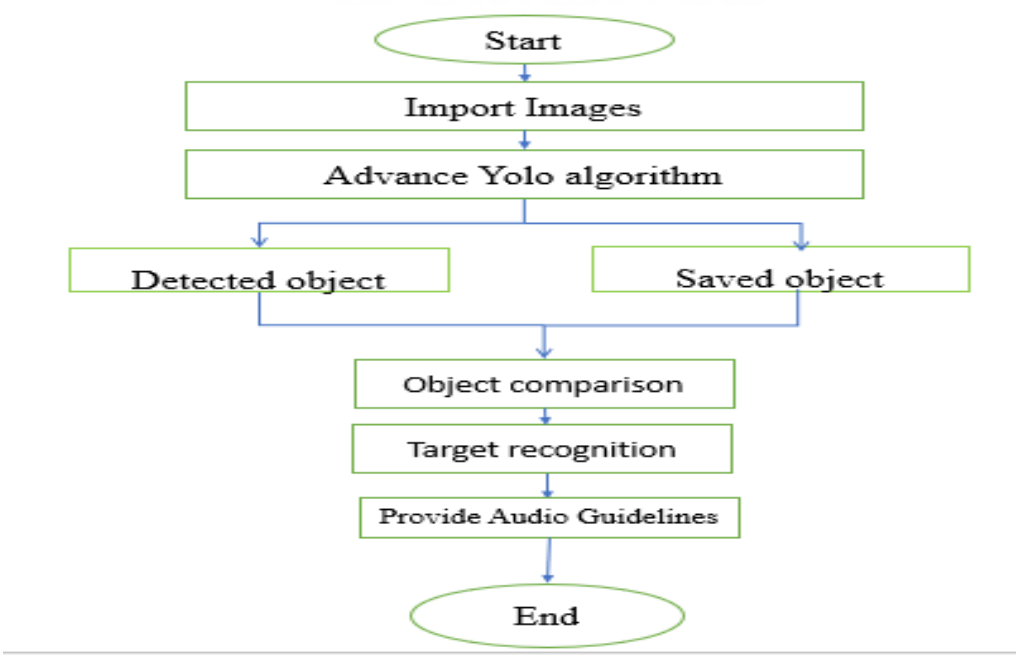


Fig: Block diagram

- The ultrasonic sensor detects objects around individuals and alerts them when they approach.
- The camera mounted on a stick captures real-time video footage.
- The camera is placed at specific locations for handicapped individuals ensuring proper classification.
- The output is high-quality with minimal noise and haze.
- The model's accuracy is remarkable and it also provides emergency assistance through GSM mode.
- User Needs Assessment: Identify the specific needs and limitations of the target users such as disabilities or challenges.
- Sensor Integration: Incorporate relevant sensors (e.g., cameras) to gather data about the user's environment and activities.
- Data Processing and Analysis: Employ machine learning algorithms to process and analyze the collected data recognizing patterns and user behavior.

- Context Awareness: Develop mechanisms to understand the context in which the user operates enabling the system to provide more accurate assistance.
- Assistive Functionality: Implement features that directly assist the user such as navigation aids and voice recognition.
- Feedback Mechanism: Include feedback loops to continuously improve the system's performance based on user interactions and evolving needs.
- Privacy and Security Measures: Ensure robust measures to protect user data and privacy adhering to relevant regulations and ethical considerations.
- Continuous Improvement: Implement mechanisms for ongoing updates and improvements to adapt to changing user requirements and technological advancements.



Conclusion:

This work is related to the design of a system for the visually Challenged person that could help their lifestyle in a much better way. The system combines the functions of various components to create a multifunctional device for blind and vision impairers. The device is built in such a way that it may be used on the go. We used YOLOV3 algorithm for detection purpose as the detection framework looks for characteristics that include the sums of picture pixels inside rectangular regions. YOLOV3 algorithm is considered to be more complicated as more than one rectangular feature is involved in the process, but it provides an ease of implementing under a conned dataset. When obstacles are identified in the path, the gadget will issue a warning through sound and haptic feedback and send the Message with location to the respected guardians if any emergency situation is faced by the blind person.

Scope for future work:

i. Recognizes familiar faces, telling you who you're talking to.
ii. Connects to your phone to call for help in case of emergency.

iii. Using GPS to find the shortest and best path based on real-time coordinates.
iv. Make the stick that learn your routines and preferred routes, making navigation in familiar areas even smoother.
v. Stick could incorporate health monitoring features like heart rate and steps, and emergency features like fall detection, with automatic alerts to emergency services or family.
vi. With increasing awareness of environmental issues, future designs could focus on sustainability, using eco-friendly materials and rechargeable batteries with long lifespans.
vii. The stick could share data in real time with a cloud-based system or mobile app, which can be accessed by caregivers or family members.
viii. upgrade features such as the type of grip, length of the stick, or type of sensor according to their specific requirements.

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