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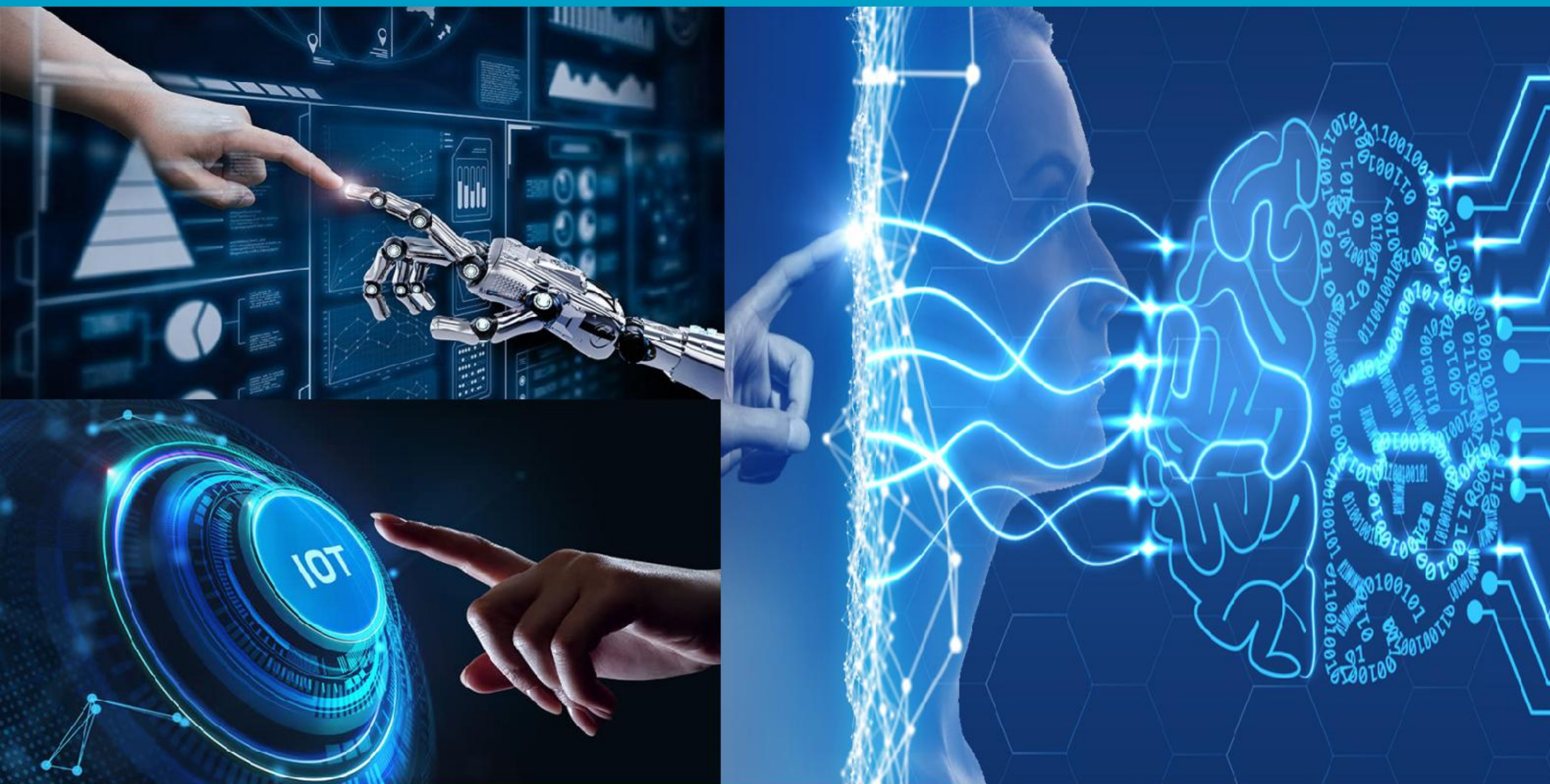


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# Electronic Jacket for Blind People

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**ABSTRACT**: According to the world health organization, just the eyes are used to transmit 90% of the information to the human brain. There are approximately 285 million blind or visually impaired persons in the globe, according to several surveys. The greatest navigation system will be provided in this paper so that blind persons can easily navigate roads on their own. The typical white cane is still used by most blind persons to navigate, but it cannot distinguish things higher than the waist. The wearable navigation jacket is created has a solution to this issue. The sensors in the prototype will sense and detect nearby objects, allowing a person who is visually impaired to be aware of them and take appropriate action.

**KEYWORDS**: Radar, ultrasonic sensor, Fire detection sensor, smoke sensor.

## I.INTRODUCTION

People who are blind or partially sighted deal daily with several difficulties. They rely on others for their everyday movements the most of the time due to their blindness. There are several assistive devices available for the blind, but the majority of them are pricey and intricately constructed. Has a result, in this study, we offer a comprehensive wearable navigation system for blind persons that is based on small and incredibly subtle sensors, such as a pi camera and ultrasonic sensors [1]. Blind people encounter numerous challenges in their daily lives. The projects objective is too offer a low-cost, highly effective way to help the blind navigate with a little bit more confidence, rapidly, and ease. The blind will be helped by an Arduino-based device to navigate without the use of a stick, which may be uncomfortable for them [2].

The most practical choice for people who become invisible in unfamiliar settings is the one. As technology develops, more and more tools are being created to assist folks who are partially or completely blind. The resources listed above cannot always assist those who are blind. Therefore, we need to develop new gadgets that can permanently assist visually impaired people while still being portable and affordable [3]. Ultrasonic sensors are used to find impediments in the area of the visually impaired user using the echolocation principle. With the aid of this worn item, a blind person can be aware of how far and in which direction an obstruction is present, with the help of this system, visually impaired people will be able to navigate more quickly, comfortably, and with greater confidence [4].

For those with visual impairment, it suggested a wearing jacket that is effective, dependable, and affordable. A sensor that allows the wearer to recognise obstacles and travels safely is integrated into smart jacket's design.the prototype model is 98% accurate for obstacles that are 200cm away. People who are blind or visually impaired can use the smart jacket for realtime navigation because it uses less electricity [5]. Several methods were employed to help the visually impaired. In typical scenarios, a stick is more frequently [6]. Anopsia can be divided into two primary groups. To put it another way, people who were born with vision impairments in the sense that they people born blind and those who later lost their sight. Depending on when vision lost occurs, each group of people navigates the world in a unique way. When a person is born without the ability to see, they use their other sensors to explore the world hearing and scent can communicate the ability to smell is frequently the most crucial indicator for a person to be aware of his surroundings one could determine his location on the trail by smelling his coffee, clothes, or other items[7]. Memory is crucial for persons who lost their sight later in life when travelling across towns and neighbourhoods. Although they can no longer be seen, their minds frequently create memories of the road to guide them along it. In actuality those who lose their sight later in life depend less on other senses; even sound and scent can be helpful companions[8]. Some services have been developed to increase although most communities are aware of these resources, not everyone is familiar with how they function. People with visual impairments benefit from white cane in many different ways[9]. To warn you of potential roadblocks like stars and pedestrian crossings, move the wite stick back and forth along the path. Guide dogs are trained specifically to make it possible for persons who are blind or have vision impairments to travel. These animals are adept at pointing out doors and navigating obstacles for their humans. While the dog's role is to direct the owner safely[10]. It is the owner's responsibility to teach the animals where to go. This is undoubtedly the simplest resource, according to the human guide, as persons who are blind may give verbal and arm signals. accessibility to independence since visually impaired persons constantly find methods to employ other senses throughout the day [11].

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These animals are adopt at pointing out doors and navigating obstacles for their humans. While the dog's role is to direct the owner safely, it is the owner's responsibility to teach the animals where to go. This is undoubtedly the simplest resource, says the human guide, as those who are taken who are blind can offer verbal and arm instruction[12]. The most practical choice for the people who become invisible in unfamiliar settings is this one. As technology develops, more and more tools are being created to assist folks who are partially or completely blind[13]. Therefore, we need to develop new gadgets that can permanently assist visually impaired people while still being portable and affordable. Our prototype is one of the technologies that enables persons with vision impairments to use sensors to detect obstacles that close by[14].

## II.METHODOLOGY

*A.Components reqiured*

The components are classified as software and hardware. Hardware components comprises of Arduino UNO, ultrasonic sensor, microwave radar sensor, MQ-137 NH3 Gas sensor, IR Fire Detector Sensor. Arduino IDE serves as the software.

1. *Arduino UNO*:The Arduino UNO is a versatile and affordable microcontroller development board with data processing facilities and I/O (input and output) pins to receive and transmit data signals. It can be programmed and controlled through a computer or a mobile phone.


Fig.2. Arduino UNO

2. *Ultrasonic sensor:* An electronic gadget known as an ultrasonic sensor uses ultrasonic sound waves to determine how far away the object is. It changes the reflected sound waves into an electrical signal. Ultrasonic waves move more quickly than regular sound waves.


Fig.3. Ultrasonic sensor

3. *Microwave radar sensor:* Microwave radar sensor detects the presence of object using microwaves and also used in security applications to detect intruders. It works by producing microwaves and then detecting the reflections of those microwaves from the objects in their proximity.

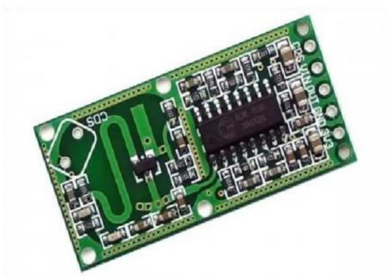

Fig.4. Microwave radar sensor

4. *DHT11 Sensor:* The DHT11 is a straightforward, incredibly affordable digital temperature and humidity sensor. It doesn't require analogue input inputs because it measures the humidity in the air around it using a thermistor and a

capacitive humidity sensor, and it outputs a digital signal on the data pin. Although it's quite straightforward to use, data capture requires precise timing.

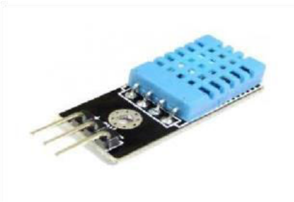

Fig.5.DHT11 Sensor

5. *APR33A3:* The APR33A3 is an 8-channel voice record and audio playback board that incorporates the APR33A series IC, a potent audio processor, together with highperformance audio ADCs and DACs.

Fig.6. APR33A3 voice playback module

6. *Arduino IDE:*It is possible to write, compile and upload code to almost all Arduino modules using the Arduino IDE, an open-source application developed by
Arduino.cc.

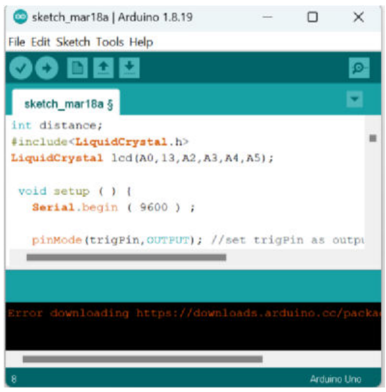


Fig.7. Arduino IDE software

*B.Working*

In the fig 9, ultrasonic sensor and microwave radar sensor are connected to the Arduino UNO. The power is supplied to the Arduino UNO.

The ultrasonic sensor transmits ultrasonic waves and receives them after they bounce off of the surface of the object. It then measures the time and entire process takes which is equal to the distance between the object and the sensor itself. Microwave radar sensor is a motion sensor which is used to detect the distance of 1m and sends an voice output.

If any vehicle or an obstacle is detected by the sensor, a voice output as front obstacle/back obstacle is arriving then the blind person move accordingly,

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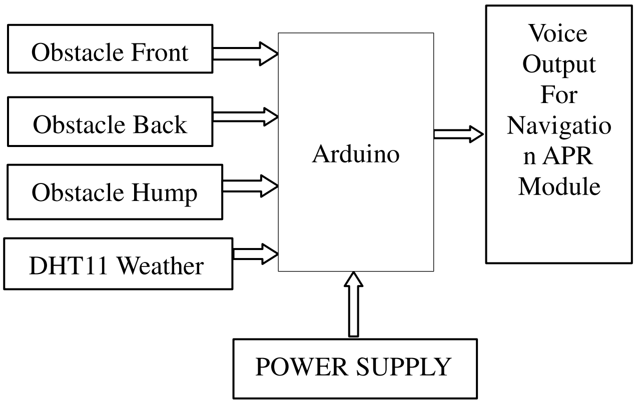


Fig.9. Block diagram

*C.Distance calculation*

The calculations will be performed by a microcontroller using an Arduino dumped C program based on the given maximum distance and distance between the system and the obstacle.

The formula for calculating the distance by using ultrasonic sound is given by equation (1),

Distance = Speed× (Time/2) (1)

Speed of sound = 340 m/s = 0.034 cm/µs

By substituting the value of speed of sound, the Eq. (1) can be written as,

Distance = 0.034 × (Time/2) (2)

*D.Flow Chart*

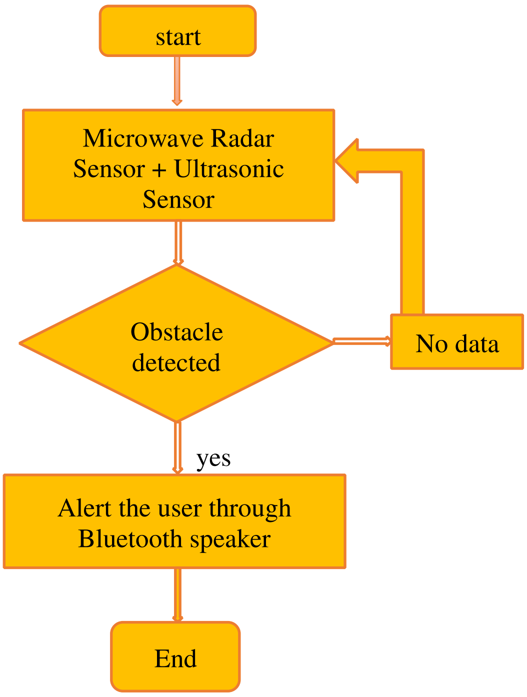

Fig.10. Flow chart

The system sensors are utilized to detect obstacles in all $360^0$ of them. The touch sensor radar is kept on the shoulder to detect objects at a distance of 1m and $360^0$. Then, the ultrasonic sensor, which is hanging down to the jacket and covers a range of 2cm-400cm, detects road humps and other obstacles. And if the fire detector sensor detects fire then it informs the user to act accordingly, and gas sensor recognizes the disease causing gas and gives an alert to user.

## III.RESULTS AND DISCUSSION

Fig.11. Sensors embedded on jacket

As a result of this jacket, each component's function is working properly and the entire system is operating effectively. When an obstacle is detected, the safety distance is calculated and the system gives an alert to user. In this prototype, the ultrasonic sensor's ranging accuracy is approximately 2 cm to 1 m and it operates successfully within the allowed range.

## IV.CONCLUSION

The article can deliver the desired results and is able to be described using structured modelling. With a few adjustments, it can be successfully implemented as a Real Time system. Technology is constantly evolving as a result of key scientific discoveries and inventions in numerous domains. Further, the majority of the units can be produced on a single piece of equipment coupled with a microcontroller, making the system compact and increasing the efficiency of the current system. Implementing components with a wider range will enable the system to be used for real-time applications.

## REFERENCES

[1] Heong-tae Kim, Bongsob Song, "Vehicle Recognition Based on Radar and Vision Sensor Fusion for Automatic Emergency Braking", 13th International Conference on Control, Automation and Systems(ICCAS 2013), vol. 7, 2013, pp. 1342-1346.

[2] Junkwang Kim, Woo Young Jung, Soon Kwon, Youngduk Kim, "Performance Test of Autonomous Emergency Braking System based on commercial radar", 5th IIAI International Congress on Advanced Applied Informatics, vol. 71, 2016, pp. 1211-1212.

[3] Guiru Liu, Lulin Wang and Shan Zou, "A Radar-Based Blind Spot Detection and Warning System for Driver Assistance", 2017, pp. 22042208.

[4] Donghwoon KWON, Suwoo PARK, SunHee BAEK, Ritesh K MALAIYA, Geumchae YOON, Jeong-Tak RYU, "A Study on Development of the Blind Spot Detection System for the IoT-Based Smart Connected Car", IEEE International Conference on Consumer Electronics(ICCE), vol.6, 2018, pp.978-3025.

[5] UshemadzoroChipengo, "Full Physics Simulation Study of Guardrail Radar- Returns for 77GHz Automotive Radar Syatems", vol.6, 2018, pp.70053-70060.

[6] ShyanShirahmad Gale Bagi, Hossein GharaeeGarakani, Behzad Moshiri, Mohammad Khoshnevisan, "sensing structure for Blind Spot Detection System in Vehicles", Interenatinal Conference on Control, Automation and Information Sciences (ICCAIS), vol.7, 2019.

[7] M. Nor, Mz Hassan, N.Ab Wahab, S.M.najib, Khairil Anwar Abu Kassim, "Development of Smart Vehicle Blind Spot Detection System Based on 24GHz Radar Sensors", International Journal of Engineering and Advanced Technology(IJEAT), vol.9, February 2020, pp. 27262730.

[8] Varanasi Venkata Naga Srivani, R Vandana, R Santhiya Devi, Vaishnavi Kumar, AmirtharajanRengarajan and et. al, "Intelligent Braking Syatem", International Conference on Computer Communication and Informatics (ICCCI), vol.5, Jan 2020.

[9] Christian Waldschmidt, Juergen Hasch, Wolfgang Menzel, "Automotive Radar-From First Efforts to Future System", IEEE Journal of Microwaves, vol.1, January 2021, pp.135-148.

[10] Rohit Khadatkar, Pritish Giripunje, PrajyotDophekar, Pranay Alone, S G Bawane, "Design of Smart Emergency Braking System in Automobile-A Review", Recent Trends in Automation and Automobile Engineering, vol.4, 2021, pp.1-5.

[11] Hemanth Suryawanshi, Rohan Sarode, "Automatic Braking System", International Research Journal of Engineering and Technology (IRJET), vol.8, April 2021, pp.2047-2050.

[12] Tsz Laam Kiang, "A Novel Multi-Sensor Crash Safety Targeting Heavy Duty Vehicle Blind Spots", IEEE Asia-Pacific Conference on Image Processing, Electronics and Computers (IPEC), 2021, pp.852859.

[13] Kaiyuan Wen, Chuqi Wu, Yishen Liang and Zhexiang Zou, "Research on Control Strategy of Vehicle Longitudinal Active Collision Aviodance System", IEEE International Conference on Consumer Electronics and Computer Engineering (ICCECE), 2021, pp. 213-216.

[14] Kunle T. Olutomilayo, SaeidNooshabadi and Daniel R. Fuhrmann, "Extrinsic Callibration of Radar Mount Position and Orientation with Multiple Target Configurations", IEEE Transactions on Instrumentation and Measurement, vol.70, 2021, pp.1-13.

[15] Galina Sidorenko, Johan Thunberg, Katrin Sjoberg, Aleksei Fedorov, Alexey Vinel, "Safety of Automatic Emeregency Braking in Platooning", IEEE Transactions on Vehicular Technology, vol.71, March 2022, pp.2319-2332.

[16] Munmun Biswas, TanniDhoom, Refat Khan Pathan and Monisha Sen Chai, A Shortest Path Based Trained Indoor Smart Jacket Navigation System for Visually Impaired Person, vol 8 and issue 12, IEEE 2022 , pp 225-238.

[17] Yalla Mani Sai Suhith, JathinKolla, Shinde Praneeth, Kamuju Abhi Subrahmanyam and ManchiryalaSamanvitha Jacket For Visually Impaired IJRTI , vol 7, issue 7,April 2022, pp 1-15.

[18] Shreyas Joshi, Nikhil Kanawade, Manisha Gaikwad, Ramgopal Sahu and KirthiAdoni, Navigation Jacket for visually impaired people (IRJET) , vol 07, issue 04 Apr 2020, pp 2-4.

[19] K P Venkat Vivek, J Vandana, K Sripooja and Abhishek Choubey , A Smart Wearable Guiding Device For the visually impaired people, IJRASET, vol 10, issue VI, June 2022, pp 75-80.

[20] Aline DarcPiculo dos santos, Ana Harumi Grota Suzuki, Fausto Orsi Medola, and Atiyeh Vaezipour,Systematic Review Of Wearable Devices For Orientation and Mobility of Adults with Visually Impairment and Blindness, IEEE Access ,vol 19, issue 19, pp 5-17.

[21] B Satish Kumar, J Dileep, S N A Ashitha, A L Sneha and S N Thoshitha , Electronic Smart jacket for the navigation of deaf-blind people International Journal of Advanced Research in computer and Communication Engineering , vol.11, issue 6, June 2022, pp 1-10.

[22] M Hersh Wearable, Travel Aids for Blind and Partially Sighted People A Review With a Focus on design Issues Sensors , vol 22, issue 8, 2022, pp 7-9.

[23] J Calder and David curtin, An obstacle signalling system for the blind, Digital ecosystem and Technologies, Conference (DEST), vol 18, issue 7, June 2022, pp 2-4.

[24] R RBourne, Flaxman, S R Braithwaite, T Cicinelli, M V Das, A Jonas, J B and K Naidoo, Magnitude, temporal trends, and projections of the global prevalence of blindness and distance and near vision impairment, The Lancet Global Health, 5(9), pp 888897.

[25] The Financial Express Visual impairment to increase dramatically study. Retrieved from impairment- to increase – dramatically - study-https://thefinancialexpress.com.bd/health/visual-1579444915(2020).

[26] Bourne, R. R., Flaxman, S. R., Braithwaite, T., Cicinelli, M. V., Das, A., Jonas, J. B., ... & Naidoo, K. (2017). Magnitude, temporal trends, and projections of the global prevalence of blindness and distance and near vision impairment: a systematic review and meta-analysis. The Lancet Global Health, 5(9), e888-e897.

[27] The Financial Express. (2020). Visual impairment to increase dramatically: Study. Retrieved from https://thefinancialexpress.com.bd/health/visual-impairmenttoincrease-dramatically-study-1579444915.

[28] Wiener, W. R., Welsh, R. L., &Blasch, B. B. (2010). Foundations of orientation and mobility (Vol. 1). American Foundation for the Blind

[29] Wiener, W. R., Welsh, R. L., &Blasch, B. B. (2010). Foundations of orientation and mobility (Vol. 1). American Foundation for the Blind

[30] Jawale, R. V., Kadam, M. V., Gaikawad, R. S., &Kondaka, L. S. (2017, September). Ultrasonic navigation based blind aid for the visually impaired. In 2017 IEEE International Conference on Power, Control, Signals and Instrumentation Engineering (ICPCSI) (pp. 923- 928). IEEE.

[31] Lakde, C. K., & Prasad, P. S. (2015, April). Navigation system for visually impaired people. In 2015 International Conference on Computation of Power, Energy, Information and Communication (ICCPEIC) (pp. 0093-0098). IEEE.

[32] Mahmud, N., Saha, R. K., Zafar, R. B., Bhuian, M. B. H., & Sarwar, S. S. (2014, May). Vibration and voice operated navigation system for visually impaired person. In 2014 international conference on informatics, electronics & vision (ICIEV) (pp. 1-5). IEEE.

[33] Sakhardande, J., Pattanayak, P., &Bhowmick, M. (2012). Smart cane assisted mobility for the visually impaired. World Academy of Science, Engineering and Technology, 70.

[34] Tapu, R., Mocanu, B., &Zaharia, T. (2014, January). Real time static/dynamic obstacle detection for visually impaired persons. In 2014 IEEE International Conference on Consumer Electronics (ICCE) (pp. 394-395). IEEE.

[35] Chen, L., Guo, B. L., & Sun, W. (2010, December). Obstacle detection system for visually impaired people based on stereo vision. In 2010 Fourth International Conference on Genetic and Evolutionary Computing (pp. 723-726). IEEE.


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