Smart Calendar Device for Differently Abled Person

P. Vijayakumar, Nandini. N, Sai Ganesh N, Ranjit Sanjay Lawand, A.V.Bharadwaja, Tamizhselvan C, Yadav Kirti Ankush

Abstract*: According to the reports of World Health Organization (WHO) there were 285 million visually impaired people in the world in 2012, out of which 246 million was having low vision and 39 million were blind. Now a days visually challenged people are facing many difficulties in there day to day life. To perform simple tasks, visually impaired people have to rely on others. Many embedded devices are available in the market which will give physical support by providing date and time in voice mode to the impaired peoples. Our proposed smart calendar will perform the following tasks such as reading out current time, day of the week, date, setting alarm, remainders about the event and scheduling the tasks. The proposed system is implemented by using raspberry pi, mic, display, speaker and camera.

Index Terms: Visually impaired, Raspberry pi, Smart calendar, Power consumption, Machine Learning, Internet of things.

I. INTRODUCTION

The government of India has directed to celebrate National Science Day with a theme "Science and technology for especially abled persons" in order to encourage innovation, awareness and reach of accessibility solutions worldwide to over one billion startlingly abled people in the world. As per records, 50 per cent of India's 100 million startlingly abled persons are under the age of 30 and there is a huge need for assistive technology products. The administration intends to unite government, corporates, teachers, NGOs and startlingly abled people in order to comprehend their necessities and give data on accessible arrangements that can incorporate startlingly abled people to take an interest freely in varying backgrounds [1] . Individuals with inabilities meet hindrances of assorted types. Years, incapacitated individuals needed to depend on another person getting things done for them, In any case, with the assistance of assistive innovation, incapacitated people can do things that would have never been conceivable – from exchanging on a light to having a voice to convey needs. Innovation has constantly lent some help for individuals with impairments, for instance, visual shortcoming, talks impedance, people with development insufficiencies or dissipates, etc. advances that could enable crippled individuals to contribute more in the working environment and enhance their personal satisfaction. The numerous devices have come into the market of electronic devices to help disabled persons, devices for seeing, devices to help listening, technology for speaking technologies for other means, head mouse Nano, robo desk for electronic devices. Braille eBook reader, tactile wand electronic stick, finger reader, be my eyes, the car for the blind, Assisted vision smart glasses are developed to guide visually impaired people. This context is taken from scientific India by the scientists, for the people and it is posted by Dr. S. S. Verma, department of Physics, S.L.I.E.T., Longowal, Distt. -Sangrur (Punjab)-148106. The proposed work discuss the implementation of smart calendar which will perform the tasks such as reading out current time, day of the week, date, setting alarm, remainders about the event and scheduling the tasks. The proposed system is implemented using raspberry pi, microphone, display, speaker and camera. The analysis and execution of the proposed gadget regarding preparing speed, control utilization, end to end delay and hardware complexity. Contribution of the Authors: This paper is organized as follows: Current section gives the introduction about. Section II describes about the related works. Section III shows the traditional assistance device for differently abled person. Proposed smart IoT based calendar device is discussed in section IV. Section V gives the hardware Implementation. The final conclusion of the proposed work is in the section VI.

II. RELATED WORKS

Velmurugan told about a device which will be assistance for visually impaired people. Raspberry-pi is a device in which the webcam is interfaced with r-pi which acknowledges a page of printed content. The OCR bundle introduced in r-pi and it examines it into advanced archive which is then exposed to skew revision, division, before highlight extraction to perform arrangement. After classifying, the text is readout by a text to speech conversion unit installed in r-pi. The output is fed to an audio amplifier before it processing. In this for their proposed work the use of MATLAB software.
The image to text conversion and text to speech conversion is done by the OCR software installed in raspberry-pi. In this the survey on types of blindness in different classes like urban, Rural have done. Then while coming to Flow of process the image capturing, pre-processing, segmentation, feature extraction, Image to text converter, Text to speech have been implemented [1].

Revised Manuscript Received on May 10, 2019

P. Vijayakumar, School of Electronics Engineering, VIT Chennai, Tamilnadu, India.
Dr. Nandini N, B.E, Computer Science and Engineering from. VTU, Belgaum, Karnataka, India
Sai Ganesh N, PG Students, Vellore Institute of Technology, Chennai, India.
Ranjit Sanjay Lawand PG Students, Vellore Institute of Technology, Chennai, India.
A.V.Bharadwaja, ECE Dept., GIET Autonomous College of Engineering and Technology, Andhrapradesh, India.
Tamizhselvan C, ECE Dept., Pondicherry Engineering College, Pondicherry, India
Yadav Kirti Ankush, School of Electronics Engineering, VIT Chennai, Tamilnadu, India.

Yuan[2] discussed about Administrations dependent on each home part timetable will frame a sort of logbook focused administration, that is, a home date-book incorporated all family unit individuals desire. It will furnish a domain with surrounding knowledge. Discussion about the ambient intelligence in home, home services to support home member activities have implemented. In this the use of BPEL for home services modeling, then home calendar service, their service model and evaluation AMD Discussion. The home robotization assumes an imperative job in current way of life in view of its entrance with top notch which will understudy spare time by diminishing human work. The home computerization is programmable, for example, sensors remote controller and correspondence framework. Home mechanization utilizes electronic control gadgets remotely and consequently. This innovation is centered on control family unit machines like light, fan, AC, and so forth naturally. It is helpful for old matured and crippled individual. Shubham[3] proposed a home appliances control in computerization utilizing GSM. The minimal effort and remote home computerization framework is executed. In this way, the ON/OFF procedure of home machines should be possible remotely. The property holder will probably get return criticism status of any home machines and can control whether turned on or off remotely from their Android cell phone, ATmega328 microcontroller with the reconciliation of GSM furnishes the automated house framework with the ideal image rate of 9600bps.

Manoj Kumar Singh proposed model receives existing regular phone system to acknowledge remote control. Here Dual Tone Multiple Frequency (DTMF) decoder has been utilized to control the correspondence between ATmega 16 and the cell phone. The microcontroller peruses the DTMF yield through an outer interfere. The framework gives full security and can be gotten to with the right secret word as it were. Here Solar Power has been utilized to nourish Power to microcontroller and transfer module just as other assistant appliances [4]. Dhiraj Sunehra proposed the speech-based home automation which uses user commands to operate electrical appliances in the home. This system is useful for physically handicapped peoples. The first system uses Bluetooth HC-05 module and Arduino Bluetooth controller for controlling electrical appliances when user is at home. The second system uses GSM/GPRS to control electrical appliances remotely. The system is developed on Raspberry pi board with python development environment [5].

Due to the increase of smart devices it turns into a need to interlink different shrewd gadgets. The Wireless Fidelity (Wi-Fi) innovation gives a great medium through which various gadgets can be associated with one system. Vikram[6] discussed the conceivable outcomes of interlinking these keen gadgets while utilizing Wi-Fi innovation. This includes the utilization of an ESP8266 Wi-Fi module, Atmel ATmega microcontroller, RF modules, sensors, transfers and strong state transfers for voltage guideline. Guide hounds are help hounds prepared to lead older or outwardly impeded individuals around impediments. These mutts help them in each other manner. Old individuals are regularly taken off alone and have least measure of connection with other individuals. For some outwardly hindered individuals, a stick or a stick causes them to distinguish and stay away from snags in the strolling ways. S.R.Barkunan[7] proposed a Voice Recognition Robotic Dog which Guides Visually Impaired People, Follows Master, Acts as Watchdog, Plays MP3 Music, Finds Sun Light and Charges itself, react to e-Skin Touch, wake up Alarm, and Informs about Time-Date-Light-Temperature

III. TRADITIONAL ASSISTANCE DEVICE FOR DIFFERENTLY ABLED PERSON

The cloud bridge automation using raspberry pi is a framework which can be connected to control home apparatuses, workplaces and machines of businesses from any remote area. The system try to solve problems faced by Handicapped people such as operating electrical switches of home appliances. The existing systems suffer from the drawback that only monitoring is possible through cloud and suffers when it comes to voice control. Hence the user cannot interact with the system with voice commands.

IV. PROPOSED SMART IOT BASED CALENDAR DEVICE FOR DIFFERENTLY ABLED PERSON USING MACHINE LEARNING

The proposed system is a smart calendar device that gets it input through voice commands and generates the output in terms of voice prompts. The brain of the system is raspberry pi which does the computational work. The system also integrates a camera for face recognition.

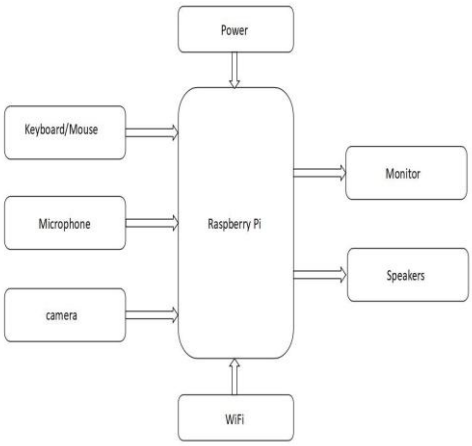

Fig.1 Proposed IoT based Smart Calendar device

Microphone: Microphone is used to acquire data in terms of voice input. The audio input when further passed through the system searches for the key words generated.

The keyword is important since the system search for the keyword and generates the output by matching the keyword.

Camera: Camera is for the detection of the person who is interacting with the system. The camera uses camera interface of the raspberry pi. The camera can shoot images at 5Megapixels and can record videos at 1080p at 30fps,

Keyboard and mouse: Keyboard and mouse acts as the input for the developers

for the system up gradation and debugging.

Raspberry Pi: Raspberry Pi is the brain of the system as it is involved in every step of acquiring data, processing data and generation of the output. The raspberry pi is powered by Cortex A53 based 1.4GHz processor with 1GB of RAM. The Linux based Raspbian OS is used which provides the function of the operating system. The raspberry pi have onboard WiFi, bluetooth and camera interface. The Raspberry Pi requires the continuous supply of 5V at 2.5A which makes it portable and power efficient. The low power requirements of the device make it portable since it can run on a portable power bank.

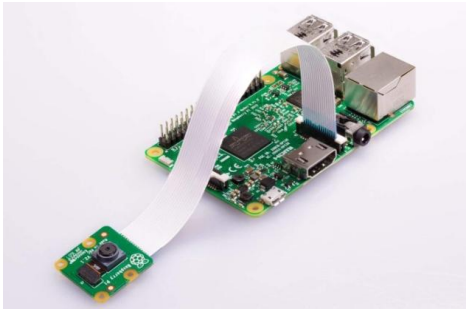

Fig 2: Raspberry Pi

Wi-Fi: Wi-Fi is being used to provide internet to the system. Since the system relies on online speech to text conversion, online command processing and text to speech conversion. The raspberry pi has onboard WiFi which supports 2.4GHz and 5GHz with 802.11b/g/n/ac standards.

Display Monitor: Display Monitor provides user the way of interaction with the system and the developer. It is an optional way of communication with the user.

Speakers*:* once the command from user is processed, the text output of the command is converted to voice using online text to speech converter. This voice which is audio output which is sent to the user using speakers which are running at the audio port.

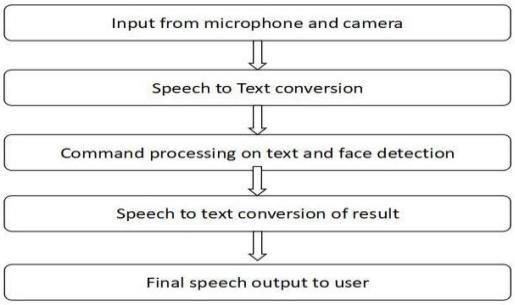

Fig.3 Event flow of IoT based Smart Calendar device

The voice commands of the user are acquired using microphone. The voice commands are converted to text using eSpeak api. eSpeak utilizes a "formant synthesis" method. This enables numerous dialects to be given in a small size. The Google speech api is a tool used to look through the command. Google Cloud Speech-to-Text empowers designers to convert audio to text by applying incredible neural system models in an easy-to-use API. Open CV is a open computer vision library used for facial recognition. Harr cascade algorithm is used to detect the face using machine learning. The CMU Lex Tool generates a pronunciation dictionary from a rundown of (English) words in a structure reasonable for use with a speech recognizer. Normalized cross correlation is a powerful tool used to generate corresponding words. The generated output is sent to the speakers.

V. HARDWARE IMPLEMENTATION

The camera is interfaced with the raspberry pi by camera interface of the raspberry pi. To get the facial characteristics haar cascade classifier from the OpenCV is used. The face is first trained by giving the data set of the user. Numpy is to calculate the haar algorithm and the face is trained, it trains by calculating the distance between two eyes and nose. The face is tested by giving the trained data set which is in the format of trained.xml and after tested it shows the recognized face and displays the name of the user with its confidence level. Services Offered By the device is:

- Date and day.
- Time.
- Weather.
- Setting remainders in calendar.
- Setting alarm and timers.
- Face recognition.

The task of knowing date and time is performed using voice command as “What is todays date and day?”, The figure [Fig. 6] shows execution and speech to text conversion of the given command. The information about the weather is executed using command “How is the weather like?”. The weather information is fetched from the Accu Weather website [Fig.7]. The reminder is set using the command “Remind me to perform certain task at day and time”. The reminder is reflected in the Google calendar for which user is signed in [Fig. 8]. The figure [Fig.5] displays the face recognition with the confidence level of accuracy.

Fig 4: Hardware Implementation of the device.

The face is recognized and displayed with user name and confidence level. The voice commands from user are acquired from mic and are executed. The tasks like setting alarm, reminder, knowing date and time are performed along with face recognition. The reminder is added to the calendar. The deletion of the reminder and the alarm is also performed by the device using voice commands.

Fig 5: Face detection

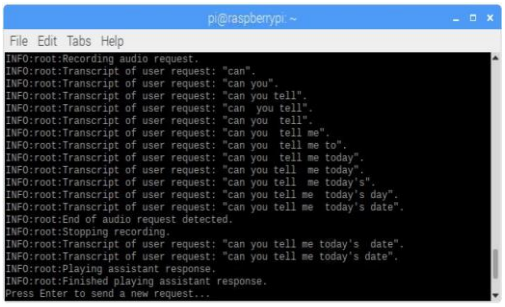

Fig 6: Speech to Text Conversion.

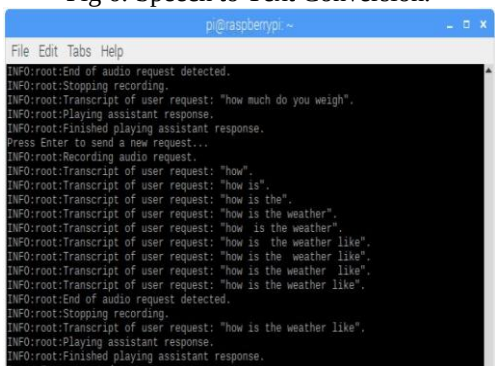

Fig 7: Interaction with the device.

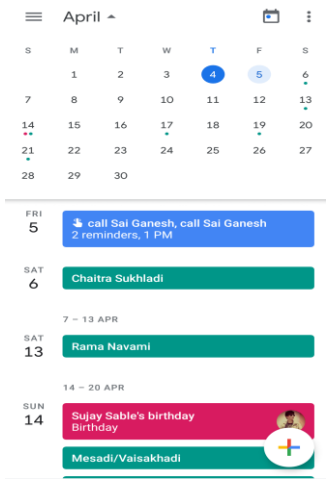

Fig 8: Setting reminder in Calendar.

VI. CONCLUSION

The visually impaired people face many challenges in there day to day life. For doing small things they relay on others like knowing date, time, setting the alarm and events. This device helps them by doing all the activities they want through voice commands as input. Initially the device is trained to detect faces using machine learning. The given data set is used for training. The face is recognized by displaying user name with its confidence level. The impaired person will get to know who is talking to the device and himself with the help of facial recognition. The voice commands from user are converted to text by using espeak API and Google speech tool is used to search the command. The CMU Lex Tool generates a pronunciation dictionary from a rundown of (English) words in a structure reasonable for use with a speech recognizer. Normalized cross correlation is a powerful tool used to generate corresponding words. The tasks given by the user will be performed and searched on the web. The final generated output is sent to the speakers.

REFERENCES

1. Aktaruzzaman, M. M., Badhan, S. M., Adnan, S., Alam, M. R., & Begum, M. T. (2017, December). Application of cloudbridge automation using raspberry Pi. In 2017 IEEE Region 10 Humanitarian Technology Conference (R10-HTC) (pp. 63-66). IEEE.
2. Velmurugan, D., Sonam, M. S., Umamaheswari, S., Parthasarathy, S., & Arun, K. R. (2016). A smart reader for visually impaired people using raspberry pi. International Journal of Engineering Science and Computing IJESC, 6.
3. Yu, Y. C., Shing-chern, D., & Tsai, D. R. (2010, August). A calendar oriented service for smart home.In The 6th International Conference on Networked Computing and Advanced Information Management (pp. 151-156). IEEE.
4. Magar, S., Saste, V., Lahane, A., Konde, S., & Madne, S. (2017, February). Smart home automation by GSM using android application. In 2017 International conference on information communication and embedded systems (ICICES)(pp. 1-4). IEEE.
5. Singh, M. K., Sajwan, S., & Pal, N. S. (2017, August). Solar assisted advance smart home automation.In 2017 International Conference on Information, Communication, Instrumentation and Control (ICICIC) (pp. 1-6). IEEE.
6. Sunehra, D., & Tejaswi, V. (2016, October). Implementation of speech based home automation system using Bluetooth and GSM. In 2016 International Conference on Signal Processing, Communication, Power and Embedded System (SCOPES)(pp. 807-813). IEEE.
7. Vikram, N., Harish, K. S., Nihaal, M. S., Umesh, R., Shetty, A., & Kumar, A. (2017, January). A low-cost home automation system using wi-fi based wireless sensor network incorporating Internet of Things (IoT). In 2017 IEEE 7th International Advance Computing Conference (IACC) (pp. 174-178). IEEE.
8. Regan, M. J., & Barkunan, S. R. (2014). Voice Recognition Robot for Visually Impaired People. International Journal of Innovative Research in Computer and Communication Engineering, ISSN, 2(1), 2320-9801.

AUTHORS PROFILE

Dr. P. Vijayakumar is currently working as Associate Professor in School of Electronics Engineering at VIT university Chennai campus, India and completed his Ph.D in Wireless Security at Pondicherry University during 2015. He has totally 12 years of teaching and research experience and published more than 40 research papers in SCOPUS /SCI Indexed National / International Journals and Conferences. His area of specialization is Elliptic and Hyperelliptic Curve Cryptography, Blockchain technology, Cryptography and Network Security, Cryptographic Algorithms, DNA Steganography, Embedded System and IoT.

Dr. Nandini N received her B. E degree in Computer science and engineering from. VTU, Belgaum, Karnataka, India in 2004,sge has completed M. Tech degree in CNE from VTU, Belgaum, Karnataka, India, her research interests data mining, web mining, image processing, and networking.

Bharadwaja A.V working as assistant professor in GIET Autonomous college of Engineering & Technology, Rajahmundry, Andhrapradesh**.** He completed his B.E from Anil Neerukonda Institute of Technology and M.Tech in VIT University, Chennai. He is currently doing research at Sathyabama University, Chennai for past two years. He has total 5 years of teaching and research experience.

Tamizhselvan C currently doing full time research in IoT and its Security issues from Pondicherry Engineering College, Pondicherry University. He received his M.Tech Degree in Wireless Communication from Pondicherry Engineering College in 2012. Since 2013 - 2016 , he worked as a Assistant Professor in Shri Krishnna College of Engineering and Technology , Puducherry. He received his B.Tech Degree in Electronics and Communication from Bharathiyar College of Engineering and Technology, Pondicherry University in 2009. His research works include naming in IoT, routing and security issues.

Yadav Kirti Ankush is currently pursuing her PhD from VIT University Chennai, India. She has completed her Diploma in Electronics and Telecommunication from Cusrow Wadia Institute of Technology, Pune along with her Bachelors and Masters of Engineering from Savitribai Phule Pune University(SPPU), Pune. She has an instructional experience of 6 years as an Assistant Professor in SPPU. She was a part of IoT product development based project in a London, United Kingdom. She has experience in embedded programming and IoT projects. Her research interest includes wireless networks, vehicular adhoc network, speech processing, smart automation and security.