International Journal of Innovative Research in Computer and Communication Engineering

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | Impact Factor: 7.488 |

|| Volume 8, Issue 6, June 2020 ||

GloveBlu: Many-to-Many Communication among Disabled Users

Rachana[1], Sneha K[2], Soundarya SBV[3], Thanuja K[4], Kalaiselvi[5]

Final year B.E Students (UG), Department of Information Science & Engineering, The Oxford College of Engineering, Bangalore, India[1,2,3,4]

Assistant Professor, Department of Information Science & Engineering, The Oxford College of Engineering, Bangalore, India[5]

ABSTRACT: Communication is also one of the activities which are considered as crucial issues at the basis of daily activities of deaf-blind people and of people with disabilities in general, since they are essential in order to have a social life. Today, the perspectives are changed with the introduction of assistive technologies, that are products, devices or systems, which allow to overcome existing digital barriers. This is the context where the GloveBlu project was born. GloveBlu is a low-cost solution supporting users to autonomously communicate with the rest of the world, letting them directly interact with other persons, without the need of an assistant or of an interpreter. The aim is to enable many-to-many communication between many users exploiting the potentiality of tuple centers as coordination media.

KEYWORDS: wearable devices, many-to-many communication, deaf-blind users, people with disability, accessibility.

I. INTRODUCTION

Communication has a key role in our daily life and in particular in daily activities of people with disabilities, since it represents a means of inclusion and of integration in the society and a way to enhance their independence. It takes on further importance in severe disability cases like deaf blindness that is the combination of blindness and deafness. Communication is of crucial importance for deaf-blind people, but it is also very complex, because communicating does not just mean talking, but also getting in touch with other people, breaking the barriers of isolation. Usually, in order to communicate and to interact with the others, several deaf-blind people need the constant presence of a caregiver, who acts as an interpreter with the rest of the world. Communication is also one of the activities which are considered as crucial issues at the basis of daily activities of deaf-blind people and of people with disabilities in general, since they are essential in order to have a social life.

II. LITERATURE REVIEW

Title: Expectations for User Experience in Haptic Communication with Mobile Devices
Author: Jani Heikkinen, Thomas Olsson & Kaisa Väänänen-Vainio-Mattila
- The main contribution of the study is the new knowledge about the expectations and user experience of potential users of haptic communication systems. The authors gained insight into the expectations towards the holistic user experience with haptic systems with mobile devices.

Title: DroidGlove: An Android-Based Application for Wrist Rehabilitation
Author: Silvia Mirri, Catia Prandi, Paola Salomoni & Lorenzo Monti
- This illustrates an original application we have created that combines serious gaming, healthcare, and smart phones to create a digital tool for wrist rehabilitation, namely Droid- Glove.

A Multimedia Broker to Support Accessible and Mobile Learning Through Learning Objects Adaptation
Author: Paola Salomoni, Silvia Mirri, Stefano Ferretti, Marco Roccetti
-This described LOT (Learning Object Transcoder), an automatic system for the production of accessible and portable learning materials. The system offers a brokering service to transcode digital video lectures based on specific student and device profiles.

Personalizing Pedestrian Accessible Way-finding with mPASS
Author: Silvia Mirri, Catia Prandi, Paola Salomoni

-This introduced mPASS, a system with the goal of equipping citizen with personalized pedestrian paths and a mapping of urban accessibility. mPASS collects data from many sources to improve the accessibility of urban environments, meeting special needs of citizen with disabilities and elderly people.

III. SYSTEM ARCHITECTURE

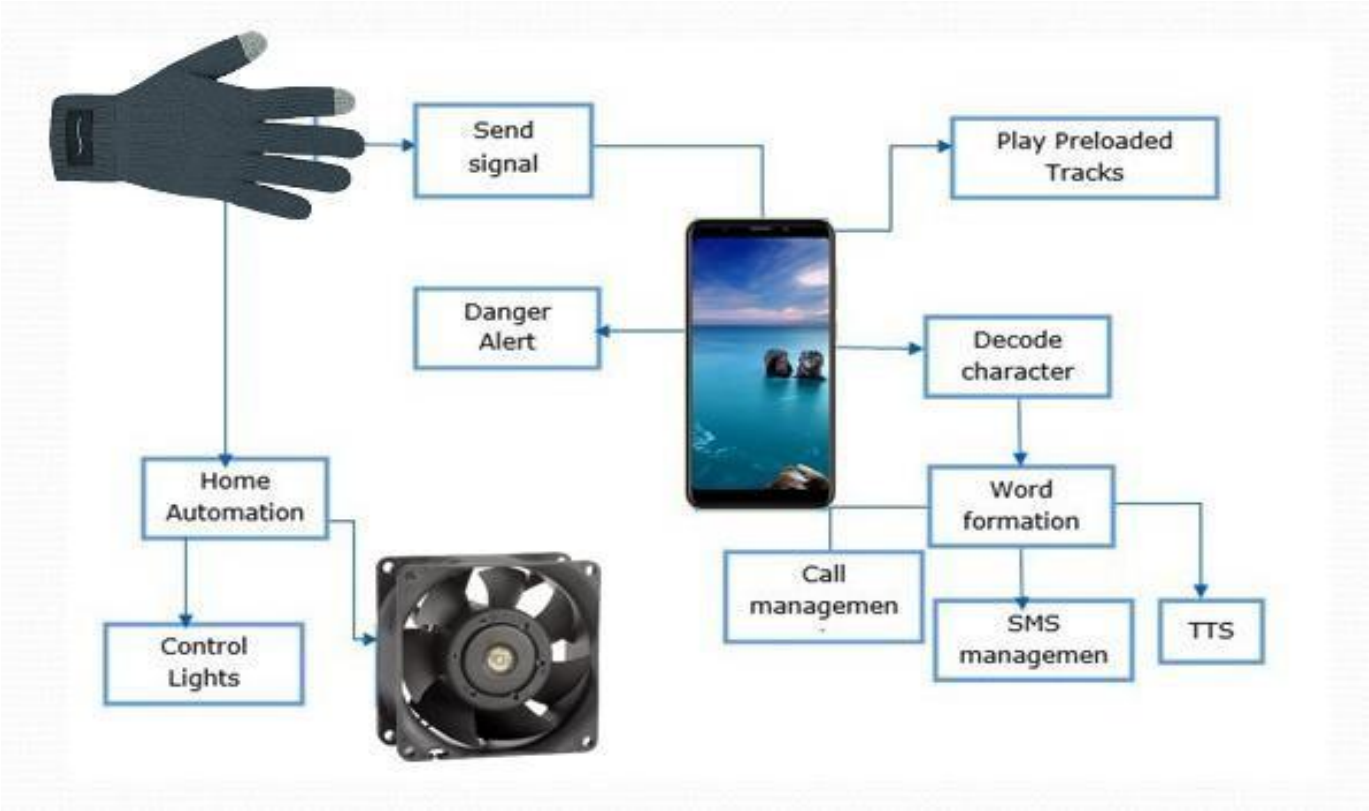

Figure:3.1

The architecture shown in 3.1 has glove which is fitted with multiple buttons that perform various operations. The glove is fitted with a battery for the power supply. The android phone has an application which is used to display the characters pressed on the glove and also show the operations performed. The phone is connected to the glove via Bluetooth. The functions performed from the android phone are shown in the architecture in 3.1. Node MCU is used for home automation such as controlling lights, fans etc. It is connected to glove via Wi-Fi module.

IV. MODULE SETS

Interaction: Using the proposed glove the deaf and dumb people can interact with others. The glove comes with several buttons. With the help of the buttons they can type whatever they want to speak. Once a button is pressed, the respective character is transferred to the android app via Bluetooth. The android app forms the words and that results into sentence. We have used google TTS API to read out the sentence. In the reverse way when a user says something, the app listens to it and converts the speech into text and display.

Home Automation: We have connected the lights and fans with the Arduino Uno microcontroller using H-Bridge. The Arduino Uno is connected with the Bluetooth HC-05. When the user wants to control the home appliances using the glove, they can use dedicated buttons to control the home appliances. So, this glove can be used by the disable people too. When there is a smoke or fire at home the kit sends a signal to the glove. The glove is fitted with a buzzer. Once receives the signal, the buzzer sets the alarm.

Call and SMS: Using the same proposed glove, blind user can send SMS or make calls. When a user wants a SMS to someone, they can use the dedicated buttons to type the sentence and special buttons to type the numbers. The details

are sent to the android app and SMS is sent from the android phone. In the same way user can type the number and press on the call button to make calls using the android phone.

Safe Button: The safety button is a special button fitted with the glove. When the user feels like danger, he/she can press the button and signal is sent to the android app. The app after that send an alert to the family members with the current location of the user.

V. IMPLEMENTATION

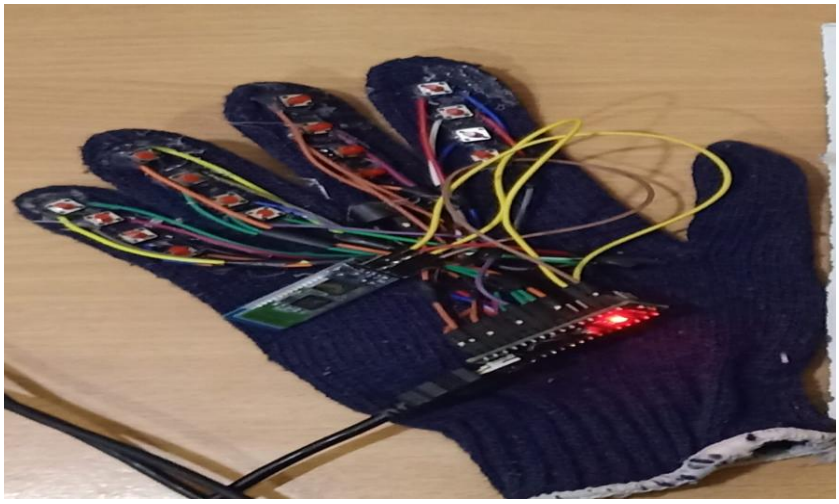

Fig 5.1 Glove Fitted with Buttons and Arduino

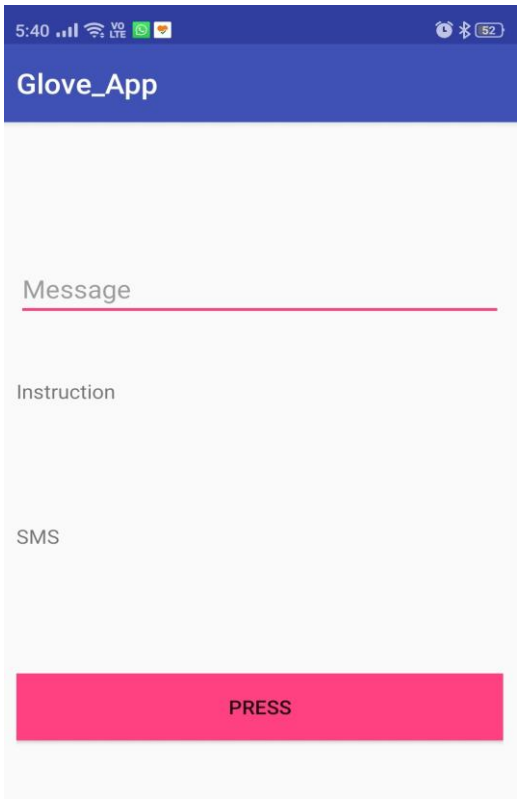

Fig 5.2 The Android App

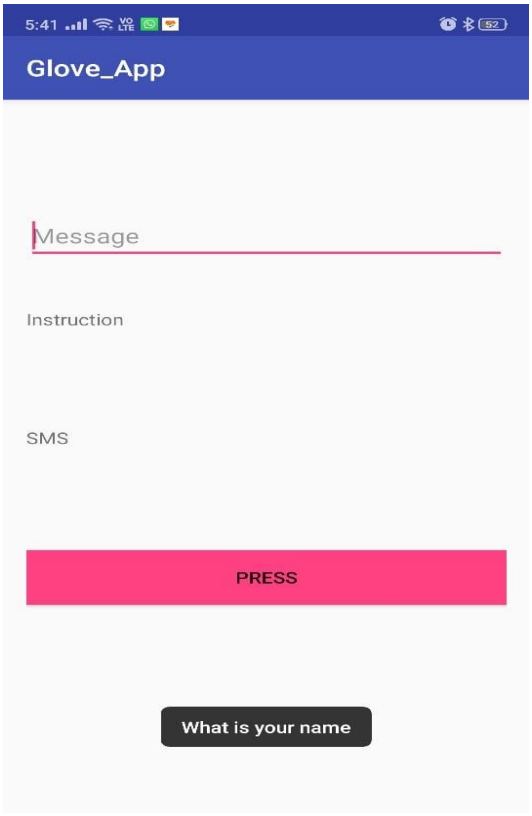

Fig 5.3 Read out Predefined Message

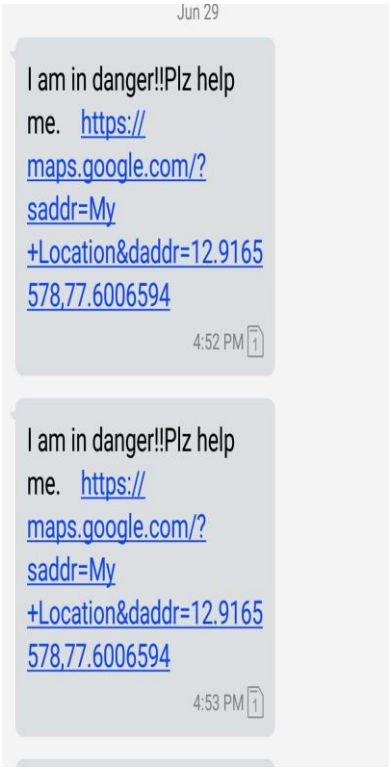

Fig 5.4 Danger Alert send to Registered phone number

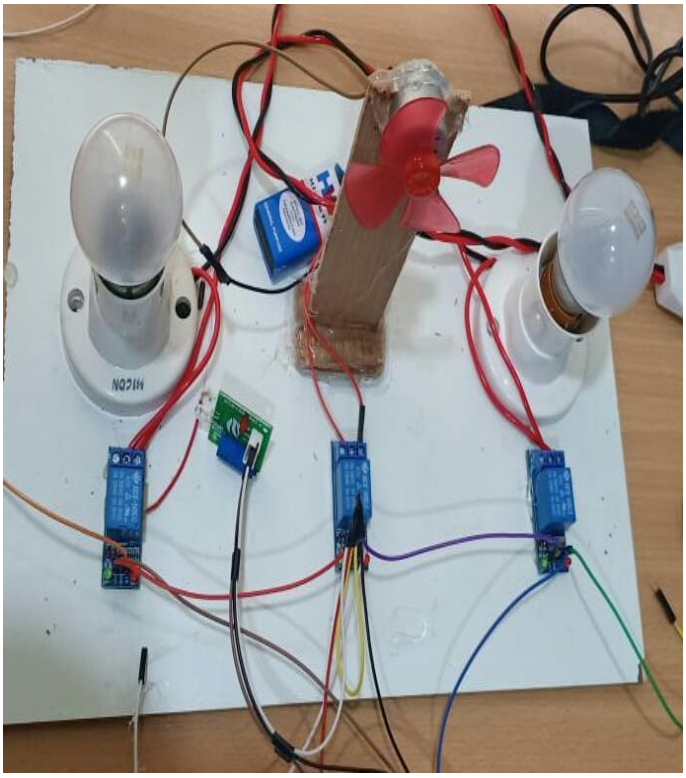

Fig 5.5 Home Automation Setup

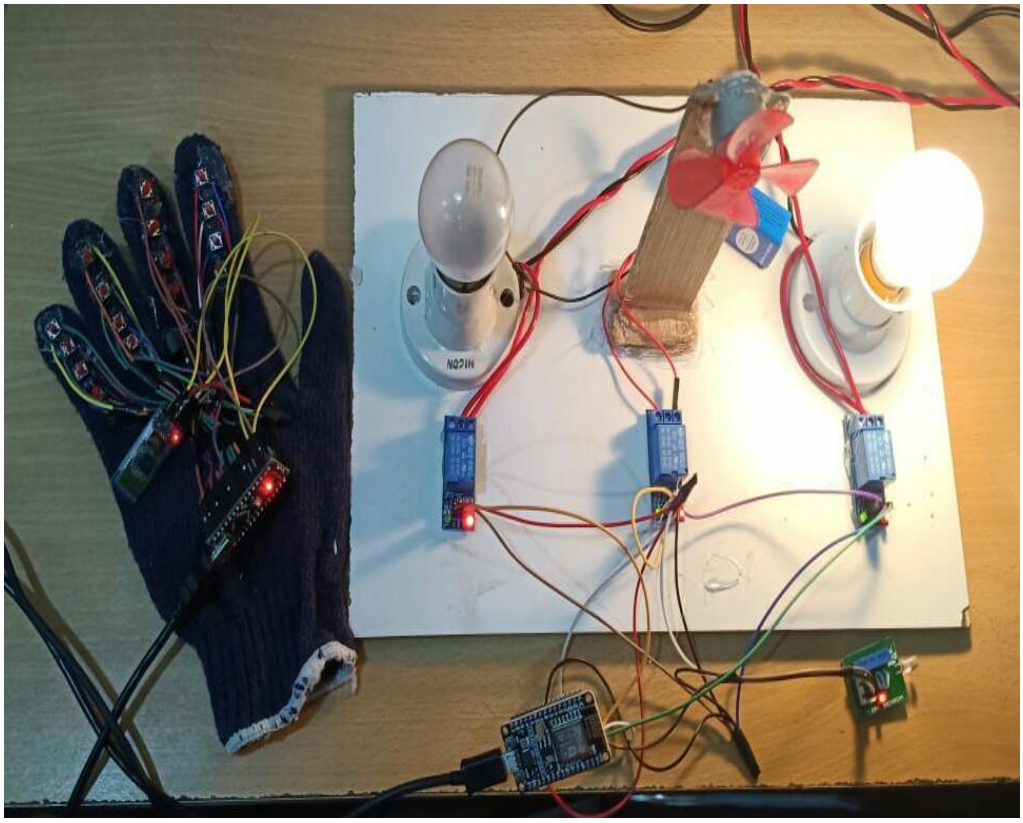

Fig 5.6 Overall Project Setup

VI. EXPERIMENTAL RESULTS

Assistive technologies supporting people with disabilities can be a strategic tool to enhance their inclusion, integration, and independence, in particular for persons with disabilities that involve more senses, such as deaf-blindness, which is the combination of blindness and deafness. Deaf-blind users can communicate by mainly exploiting the sense of touch. Focusing on this kind of communication, we have designed and developed Glove-pi, a low-cost wearable device, based on a glove equipped with mobile devices via Bluetooth. All the systems, services, devices and appliances that are used by disabled people to help in their daily lives, make their activities easier. GloveBlu is an open source assistive system, developed employing low costs hardware components. In particular, the system architecture is composed by three main components: (i) a glove; (ii) an Arduino Uno; (iii) a button. Moreover, an android app has been developed to communicate with the user and display and listen the phases created by the deaf-blind user, using the glove. Using the glove user can send the alert message.

S2 # Test Case	UTC- 2
Name of Test	Working of several buttons.
Expected Result	With the help of the buttons the user can type whatever they want to speak. According to the respective buttons the characters are transferred to the android app via Bluetooth.
Actual output	Same as expected.
Remarks	Successful

Fig 6.1 Testcases for working of several buttons

S3 # Test Case	UTC- 3
Name of Test	Call/SMS management.
Expected Result	Some specified buttons are used to type the sentence to send the message and special buttons to type the numbers and make the calls.
Actual output	Same as expected.
Remarks	Successful

Fig 6.2 Testcases for call and SMS of the glove

VII. CONCLUSION AND FUTURE WORK

In this project we presented Glove Blu, an open source assistive system developed employing low costs hardware components. In particular, the system architecture is composed by three main components: (i) a glove; (ii) an Arduino Uno; (iii) a button. Moreover, an android app has been developed to communicate with the user and display and listen the phases created by the deaf-blind user, using the glove. Using the glove user can send the alert message.
As a future work, it will be interesting to investigate the two-way communication of data not only from glove to the mobile app, but also from the mobile app to the glove.

REFERENCES

[1] J. Medina, Brain Rules: 12 Principles for Surviving and Thriving at Work, Home, and School (Large Print 16pt). ReadHowYouWant. com, 2011.

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | Impact Factor: 7.488 |

|| Volume 8, Issue 6, June 2020 ||

[2] J. Delwiche, "The impact of perceptual interactions on perceived flavor," Food Quality and preference, vol. 15, no. 2, pp. 137–146, 2004.
[3] S. Mirri, C. Prandi, M. Roccetti, and P. Salomoni, "Food and gastronomic heritage: Telling a story of eyes and hands," in Computers and Communication (ISCC), 2016 IEEE Symposium on. IEEE, 2016, pp. 6–9.
[4] S. Mirri, P. Salomoni, A. Pizzinelli, M. Roccetti, and C. E. Palazzi, "" di piazza in piazza": Reimagining cultural specific interactions for people entered exhibitions," in 2016 International Conference on Computing, Networking and Communications (ICNC). IEEE, 2016, pp. 1–5.
[5] J. F. Delwiche, "You eat with your eyes first," Physiology & behaviour. Vol 107, no. 4, pp. 502– 504, 2012.
[6] C. Spence, K. Okajima, A. D. Cheok, O. Petit, and C. Michel, "Eating with our eyes: from visual hunger to digital satiation," Brain and cognition, 2015.
[7] S. Ferretti, S. Mirri, C. Prandi, and P. Salomoni, "Automatic web content personalization through reinforcement learning," Journal of Systems and Software, 2016.
[8] "User centred and context dependent personalization through experiential transcoding," in 2014 IEEE 11th Consumer Communications and Networking Conference (CCNC). IEEE, 2014, pp. 486–491.
[9] S. Mirri, C. Prandi, and P. Salomoni, "A context-aware system for personalized and accessible pedestrian paths," in High Performance Computing & Simulation (HPCS), 2014 International Conference on. IEEE, 2014, pp. 833–840.
[10] P. Salomoni, C. Prandi, M. Roccetti, V. Nisi, and N. J. Nunes, "Crowdsourcing urban accessibility: Some preliminary experiences with results," in Proceedings of the 11th Biannual Conference on Italian SIGCHI Chapter. ACM, 2015, pp. 130–133.
[11] M. Roccetti, S. Ferretti, C. E. Palazzi, P. Salomoni, and M. Furini, "Riding the web evolution: from egoism to altruism," in 2008 5th IEEE Consumer Communications and Networking Conference. IEEE, 2008, pp. 1123–1127.