Multi-Communication System for Physically Disabled PeopleUsing Raspberry Pi

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DOI:*https://doi.org/10.5281/zenodo.2533502*

Abstract
Today to lead our life we needed to keep running with our quick materialistic world. We express our considerations, by speaking with various individuals in various languages and in various ways Therefore there effectively. In any case, it is troublesome for physically incapacitated individuals, for example, for example, dump, hard of hearing, visually impaired and deadened to express their considerations and thoughts. Is a need to develop such a concrete solution for physically disabled people which will results as a better communication media for them. The designed system resolves the said problems. (1) Dump people can express their thoughts by pressing keyboard buttons (2) When blind/deaf person speaks, Raspberry pi based device converts it into text and displays on screen. (3) The paralyzed people by wearing flex sensor glove can express their thoughts through feasible figure movement. All these activities are possible with a unique embedded system using raspberry pi and disabled people can lead their life peacefully and independently through smooth communication of their ideas and thoughts with their family members, friends and society.

Keywords: Raspberry Pi, Arduinonano, Flex sensor, USB keyboard, SD card, Microphones

INTRODUCTION

Individuals with handicaps are powerless due to the numerous obstructions we confront attitudinal, physical, and money related. Tending to these hindrances is inside our scope and we have an ethical obligation to do as such. Be that as it may, most essential, tending to these obstructions will open the capability of such a large number of individuals with such a great amount to add to the world. Governments wherever can never again disregard the countless individuals with inabilities who are denied access to wellbeing, recovery, support, training, and work and never find the opportunity to sparkle.
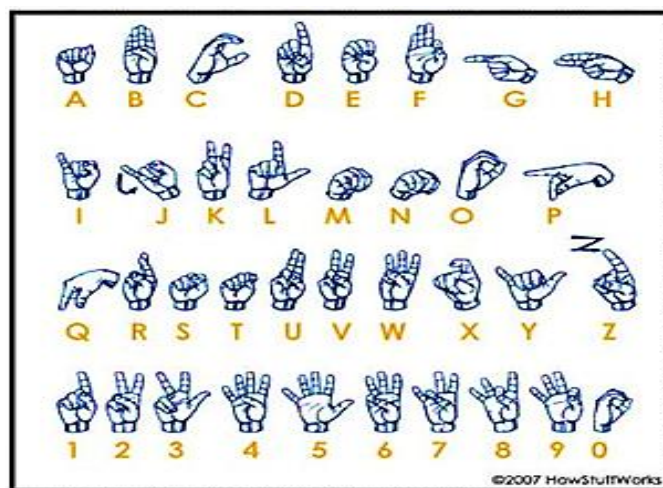

*Figure 1:*Sign Language Symbols.

In day-to-day life, we express our thoughts, by communicating with different people in different languages and in different ways very easily. But, it is difficult for physically disabled people such as such as dump, blind and paralyzed to express their thoughts and ideas. We are expressing our thoughts in various easily. We can express our thoughts very effectively and easily, but for these people this is not easy task. They need to struggle for doing their own work.

When the blind people need to go school/college and learn, it may cause some unique problems for their university/college life as well. There is a requirement for a Human Interpreter to impart a message for a visually impaired child to do his/her schooling. When such people try to express something, we do not have enough patience to listen them. Around nine billion individuals on the planet are tragically challenged. The correspondence between a hard of hearing and hearing individual stances to be a major issue contrasted with correspondence among visually impaired and ordinary visual individuals. This makes a next to no space for them with correspondence being a basic part of human life. The visually impaired individuals can

talk uninhibitedly by methods for ordinary dialect while the hard of hearing moronic have their very own manual-visual dialect known as gesture based communication. Communication via gestures is a non-verbal type of intercourse which is found among hard of hearing networks in world. The dialects don't have a typical source and consequently hard to decipher. Paralyzed people who are not able to speak but are able to move their fingers face many barriers when trying to do any physical activity. They feel helpless and lonely while living life. For that purpose they use aids such as wheelchair, guide, support dogs and white cane because the expenditure for health care and nursing is becoming a big burden for our society. They feel very complicated with these communication aids too.

RELATED WORK
S. Shaheen and A. Umamakeswari (2013) proposed "3in 1 gadget for physically handicapped individuals" as appeared in Figure 2. The discourse to content IC associated with the processor which changes over the visually impaired individual's voice and can be seen on the presentation.
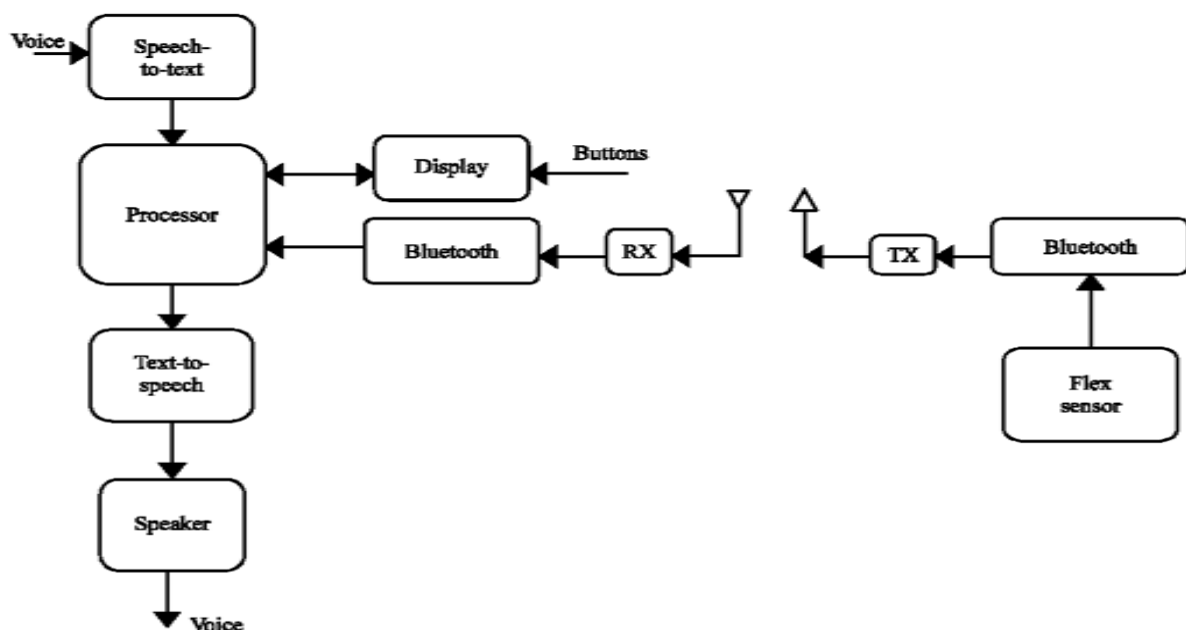

Figure 2:Block Diagram of existing system.

The dump person passes on his/her essential needs by squeezing console catches.The console sends content flag to the processor and the processor changes over it into sound configuration.

The paralyzed individuals by wearing flex sensor checked gloves pass on their fundamental prerequisite with the development of fingers. All these three procedures getting executed utilizing Bluetooth Tx and Rx demonstrate as appeared in figure. The downside of this gadget is that exclusive single word or short directions are prepared utilizing discourse to content IC. Likewise precision gets diminished due false activating [1].

D.D.Pande, M. Praveen Kumar (2014) in "A Smart Device for People with Disabilities" talked about ARM7 LPC2184 based shrewd gadget which is useful for physically incapacitated and daze person. The just downside is in this gadget is that discourse to content is occurring with short directions [2].The "AVR and ARM Based Speaking System for Deaf and Dumb proposed by Mantisha Gupta, ShriyaAbrol, TaniyaAnand, HanishVerma, GurpreetRaina (2017) examined the framework through which hard of hearing and unable to speak could pass on their message to hearing people[3]. The "Talking module for Deaf and Dumb" proposed by DivyansheeMertiya, AyushDadhich, BhaskarVerma, and DipeshPatidar (2014) is a compact implanted framework utilized for the location of finger signals [4]. The Interacting Device for Deaf & Dumb using Atmega 328 Processor proposed by AbhijeetSondhi, PareshKasa and KuldeepSolanki (2015) recognizes signs and their conversion into speech [5]. The "Smart Speaking Glove-Virtual tongue for Deaf and Dumb" proposed by M.S.Kasar, AnvitaDeshmukh, AkshadaGavande and PriyankaGhadage (2016) discussed a

module which converts finger movement to sound & also control the working of device like T.V, fan [6]. The "Electronic Speaking Glove for Speechless Patients - A Tongue to a Dumb" proposed by Syed Faiz Ahmed, Syed Muhammad Baber Ali, Sh. SaqibMunawwarQureshi (2010) is the useful device for the deaf and dumb[7]. The "Assistive Translator for Deaf & Dumb People" proposed by S. B. Shrote, MandarDeshpande, PrashantDeshmukh and Sanjay kumarMathapati (2014) explained that this device as a translational device for deaf mute people using glove technology [8]. Wise Control Systems for Physically Disabled and Elderly People for Indoor Navigation" proposed by Thangadurai N. also, Kartheeka. S. (2014) clarified plan of wheelchair [9]. The Exo-Glove, a Soft Wearable Robot for the Hand with a Soft Tendon Routing System proposed by Hyunki In, Brian Byunghyun Kang, Minki Sin, and Kyu-Jin Cho (2010) explained that Soft wearable robots are good alternatives to rigid-frame exoskeletons because they are compact and lightweight [10].

DESIGNED SYSTEM
The designed system is the multi-communication aid system for physically disabled people using Raspberry pi. The block diagram is shown as follows in Figure 3.

It works in three modes, (1) Keyboard Mode (2) Voice to text mode (3) Gesture mode. In first mode the dump person can express his/her basic need by pressing keyboard button. Arduino Nano converts it into 4-bit binary sequence. This binary sequence will read by the raspberry pi controller (as shown in Figure 4) and will produce the output in the form of audio/voice. Thus, any person along-with him can understand his demands and needs very easily.

As per second mode, when blind/deaf person speaks, the audio input is processed

through Google speech API and will be given to the controller (as shown in Figure 5). The spoken statements will get converted into text using raspberry pi coding and such text can be easily understood by dump or deaf person.

The paralyzed person as single feels very helpless. When these people want something, they find it very difficult to express and also we are not having such enough patience to listen them.
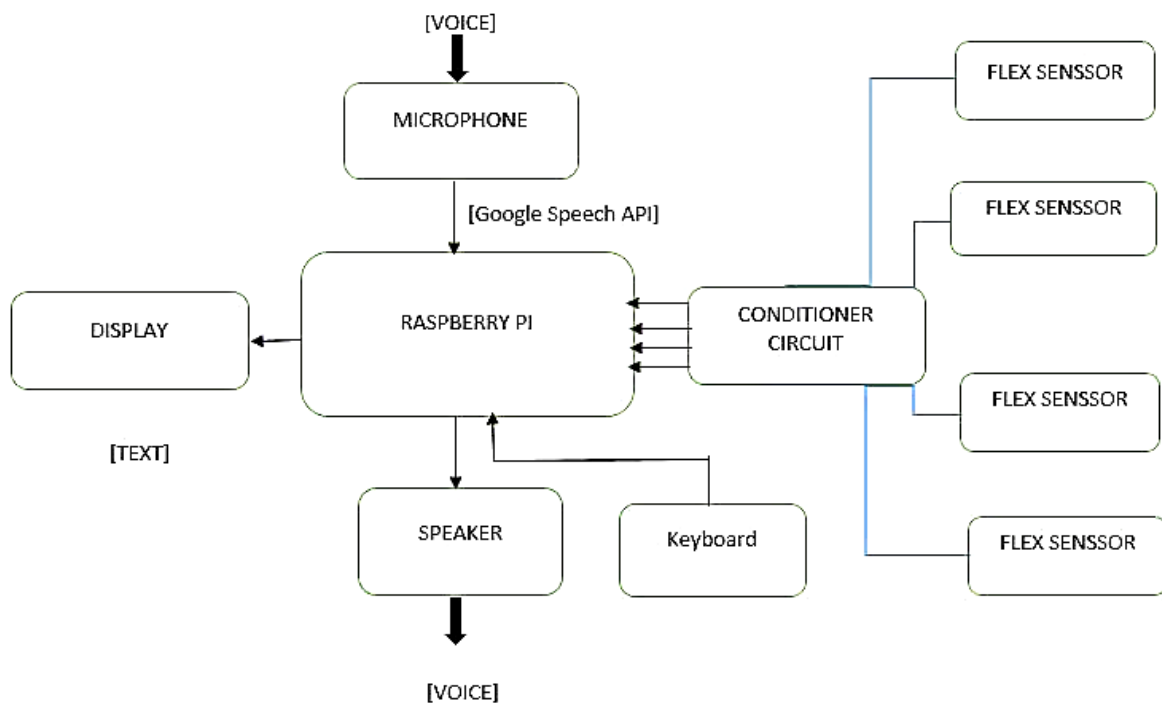

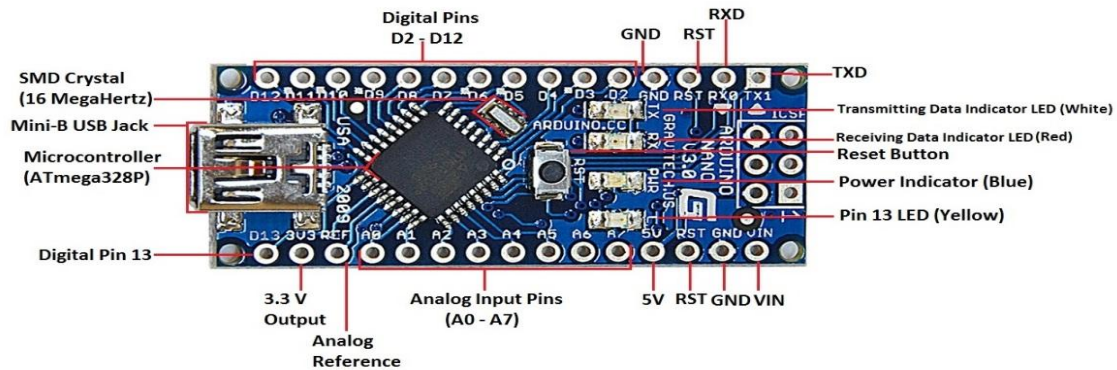**Figure 3:**Block Diagram of Implemented System.
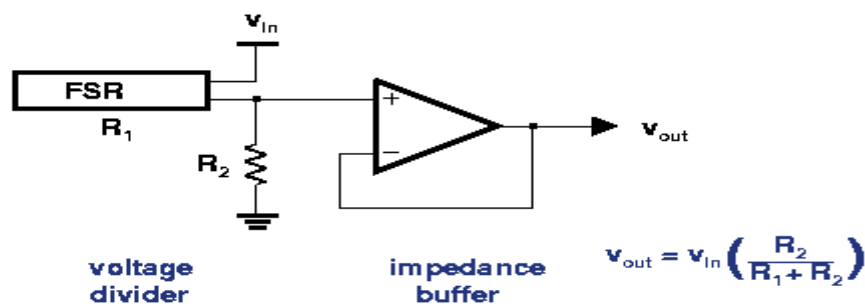

Figure 4: Raspberry pi

Figure 5:*Arduino Nano*

Figure 6:*Flex Sensor Circuit*

$$v_{out} = v_{in}\left(\frac{R_2}{R_1 + R_2}\right)$$

Third mode allows the use of hand gloves attached with flex sensor (as shown in Figure 6) to reveal persons demands or needs through simple physical displacement of figure can. This displacement can be produced in text or audio/ voice format and it is easily understood by any other person.

Thus all the physically disabled people can easily communicate with each other and society smoothly and effectively as that of normal person's.

RESULT AND ANALYSIS

The view of hardware is given here. The results for keyboard mode in tabular form(Table 1) as follows:

Table 1:*Messages of Key*

Key	Message for need
T	Want to go toilet
F	Want food
D	Call doctor
O	Want to go out

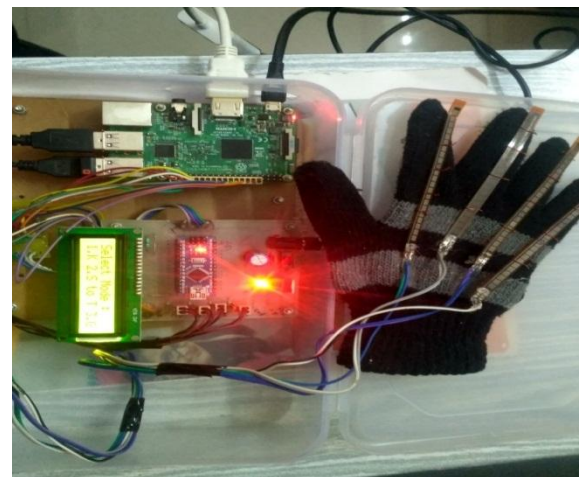| C	Want to change cloth
B	Bathing
W	I want water
0	Exit from keyboard mode

Figure 7:*Keyboard Mode*

Voice to text is the second mode in which voice is recognized within 5 second through Google API at sampling rate of 48 KHz. The results are as follows (as shown in Figure 7):
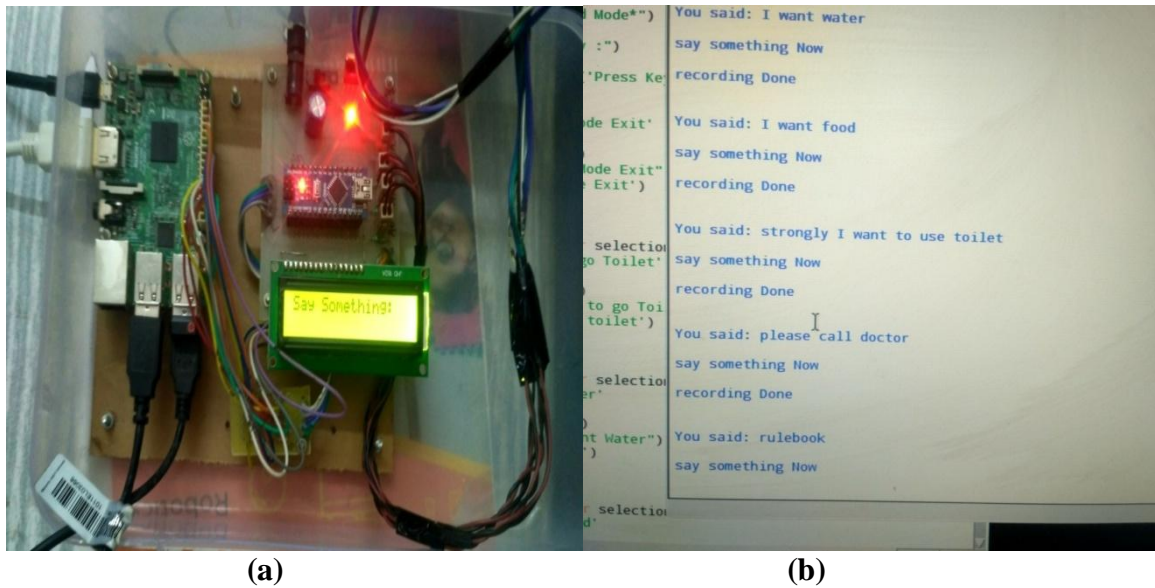
(a)   **(b)**

Figure 8(a)&(b): *Voice to text mode.*

Third mode is the gesture mode(as shown in Figure 9 and 10) in which finger movements are detected using flex sensors andOutput messages get displayed on 16*2 LCD display/screen (as shown in Figure 8(a) & (b) and in Table 2).

Table 2:*Output Messages of Digital Bits.*

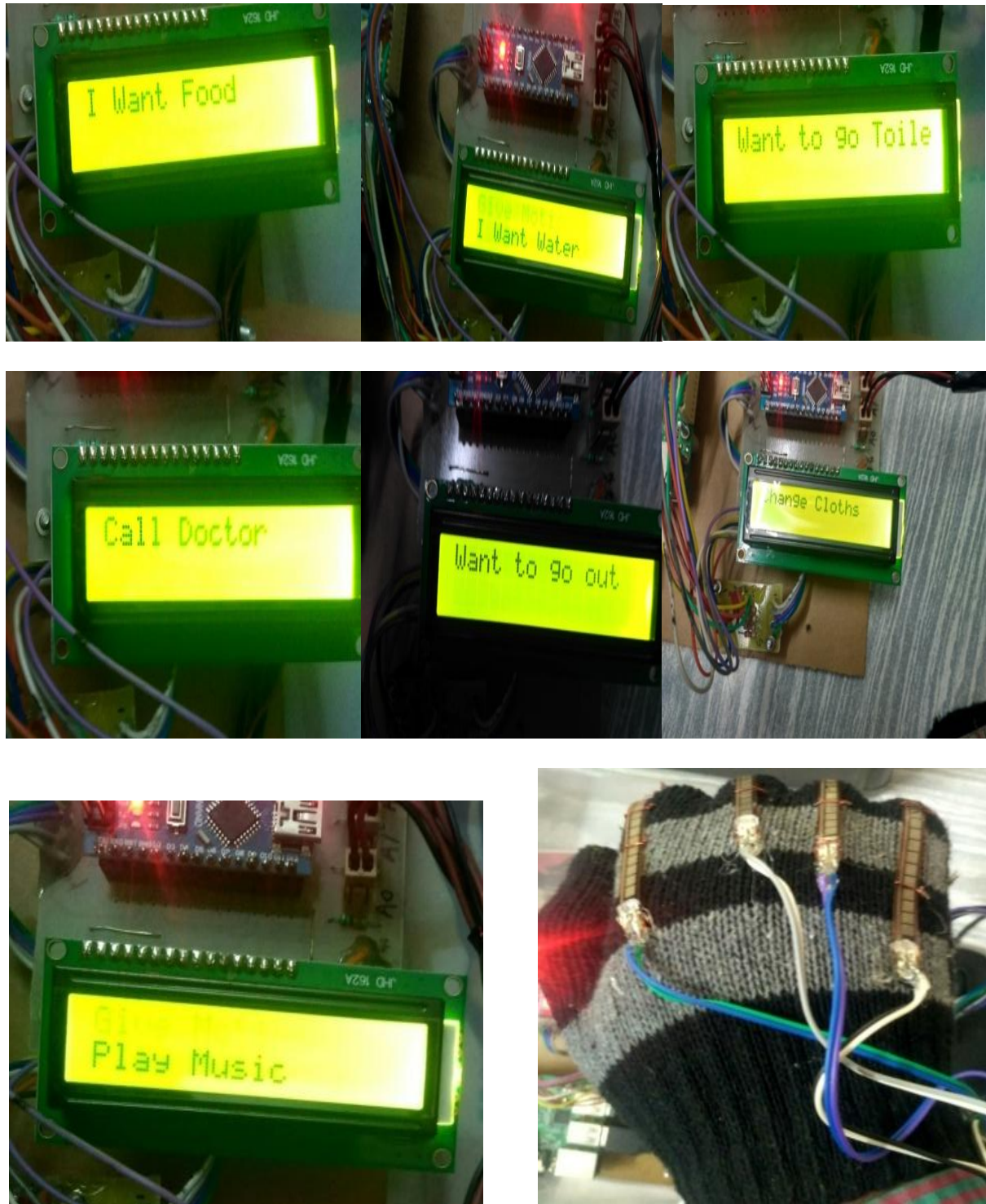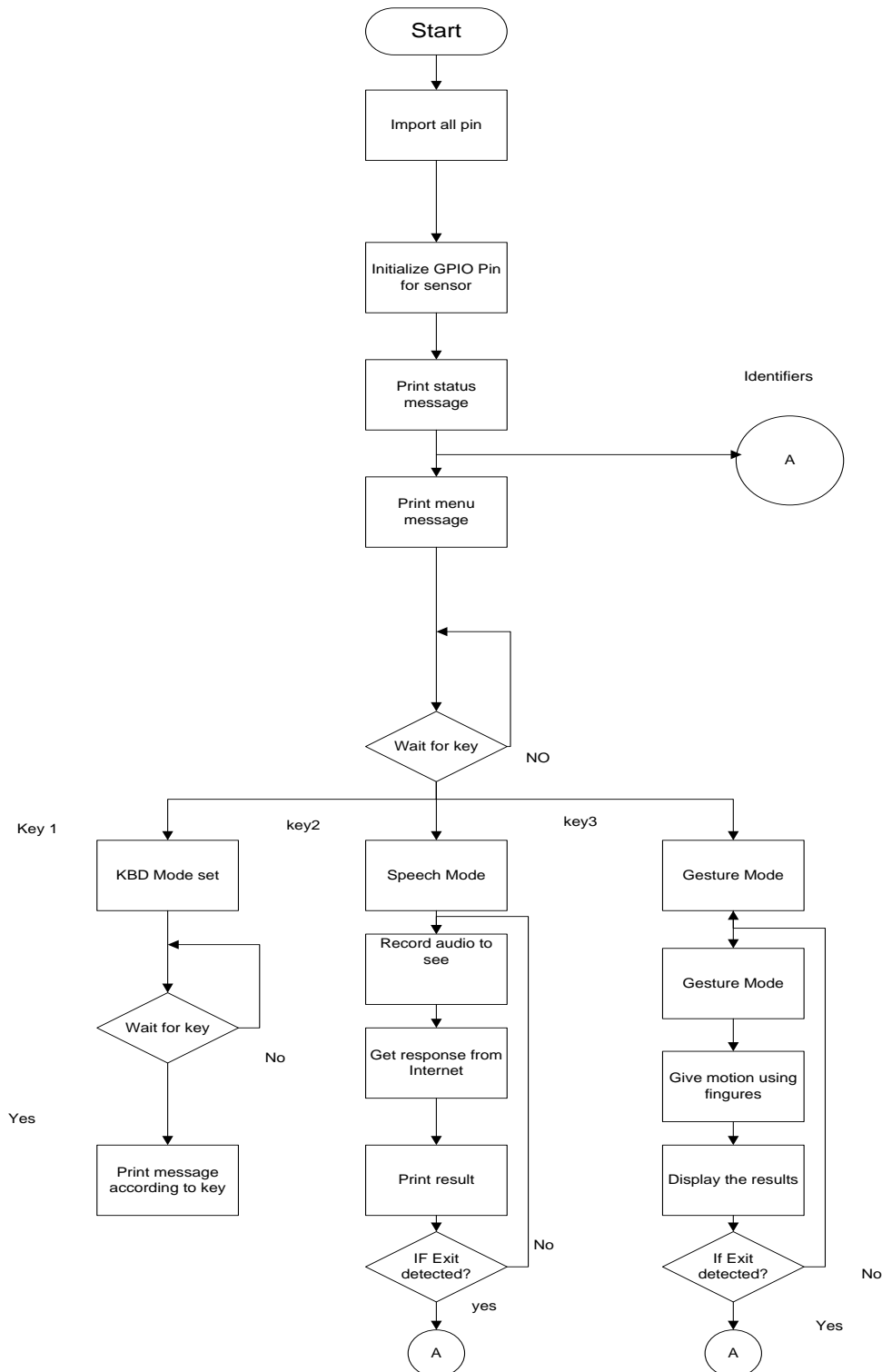| Digital bits				Messages appeared on screen
A3	A2	A1	A0	
1	0	0	0	Want to use toilet
0	1	0	0	Want water
0	0	1	0	Want food
0	0	0	1	Call doctor
1	1	0	0	Want to go out
1	0	1	0	Want to change cloths
1	1	1	0	Play music
0	1	1	1	I want tea
1	1	1	1	EXIT

Figure 9:*Gesture Mode*

Figure 10:*Photos of Output Messages on LCD Display and Figner Movement.*

FLOWCHART

CONCLUSION

The planned framework is the raspberry pi based compact gadget which can goes about as the reasonable and versatile arrangement of communication for dump, visually impaired and incapacitated individuals. This device eliminates the disadvantage related with Bluetooth

technology and text-to speech converter IC using Internet facility of Raspberry pi processor. This device greatly resolves the problems faced by these people such as poor communication, less confidence, feeling of helplessness. These people can express their thoughts or basic requirements to each other and to the society using this system. This device acts as communication channel to these individuals and can lead their life easily as all other individuals living in the general public. It is a multi-correspondence supported gadget having better lifetime and extraordinary strength, dependability and effectiveness.

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