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"Frida" The Portable Virtual Assistant

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Abstract:

In this paper, design a portable virtual assistant based on artificial intelligence (AI) are presented. A portable virtual assistant named as FRIDA are designed to satisfy our basic requirements such as internet search on needed topic, language translation, play music, etc... For that use a task executor program along with AI is included to make as assistant. Main application of FRIDA such as speech recognition by having no any compulsions to use any keyword can use any word related to the particular execution. In this prototype, use own chrome it is personally created so don't have any need to pay any royalty to any companies like Google, Bing, etc. The main component of this device is a raspberry pi.

Index Terms - Raspberry pi, FRIDA, Artificial intelligence

I. INTRODUCTION

In this modern era, every human being wants an assistant to satisfy all their needs. With the advancement in the technology today, it isn't a wonder if people get used to having a family friendly personal assistant or social robots in the near future [1]. Sometimes, after a long tiring day at work, people would prefer music and spending some time on the social media for relief from stress. In job requisite, humans went to many places across the world; in that case language translation plays a vital role for communication with their colleague. In such cases robots may be very handy. Because of the requirements of smart robots, the Smart Personal Robotic Assistants developed by Pooja Makula and team whose model is controlled by voice commands [2]. The design for the automatic speech recognition and spoken language understanding systems of a voice based personal assistant application that was commercially released in Japan [3,4] Sridhar Raj designed robotic library assistant. Database of all the books will be maintained by every library. RFID tags are being tagged to every book and the location of the book can be found by using RFID reader mounted on the robot [5].By using motion features, elderly fall detection are analyzed via SVM framework [6].Dani Reagan designed Differently-abled person track and follow robot for luggage transport. The ROS platform enables the use of its packages for making our robot to track and follow the human [7-9].This paper proposes the model of portal virtual assistant robot with extensive features.

II. DESIGN AND SPECIFICATIONS

The proposed system named as FRIDA based on the actual existing products like Alexa and Google Home Mini. But in this design has more advanced and security audit for normal peoples. It is in accordance with the economic level of Indian middleclass people and mentality of them. This

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device is designed and in also the other hand Alexa or Google Home mini or designed in the way of advanced like playing songs, ordering products online and so on. FRIDA is designed in such a way to have no any specific keywords for giving commands that can use any words relating to the commands to execute the work. A portable virtual assistant named as FRIDA are designed by using python coding language, sample program is given in the figure 1.The figure 1 tells the basic steps to perform sample applications. In figure 1 presents how speech recognition is performed.

```python
engine=pyttsx3.init()
voices=engine.getProperty("voices")
voice_id="HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Speech\Voices\Tokens\TTS_MS_EN-US_ZIRA_11.0"
engine.setProperty("voice",voice_id)
engine.runAndWait()

def gncmd():
    micro=sr.Recognizer()
    with sr.Microphone() as source:
        sound=micro.listen(source)

    try:
        query=micro.recognize(sound)
        print(query)
    except:
        return "None"
    return query

if __name__=="__main__":
    while True:
        query=gncmd().lower()
```

Figure 1: Sample design program in python

Figure 1 Alt Text: It represents how speech recognition is performed by FRIDA. In speech recognition basics are listening and recognizing, these are analyzed.

Hardware Prototype size as 64mm*30mm to perform various requirements based on loaded program.

Table 1: Parameters for the proposed prototype

Parameters	Values(mm)
height	14
length	64
breadth	30

The following are the vital hardware features used in the design of the proposed prototype.

A. Microcontroller: The Atmega 328P on the Arduino Uno board is used to process the raw values from the inertial measurement unit and convert them into a user understandable format. The Arduino is a software development environment that is compatible with the Atmega AVR microcontrollers. The Uno consists of 14 digital output pins along with a USB jack, an ICSP header and a reset button on-board.

B. Microcomputer: The Raspberry Pi model 3B is used as a computing engine. It is a credit card sized computer with 1.2 GHz quad-core ARM CortexA53 CPU and a Broadcom BCM2837 SoC. It has an on-board memory of 1GB which is a LPDDR2-900 SDRAM. There are 4 USB 3.0 ports and a 10/100 MBPS Ethernet, Bluetooth 4.0.

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Hardware specifications
1. Raspberry pi zero w
- 1GHz BCM2835 single-core processor with 512MB RAM.
2. Seed studio 2 mic pi hat
- WM8960, a low power stereo codec
- built in microphone
3. Speaker
- 1 watt, 8 ohm
4. Headphone
- any ordinary headphone can be used

III. FLOWCHART

The simple working procedure for FRIDA is given in the flowchart as mentioned in the below figure 2. The functions of FRIDA are performed with the help of model only shown in the figure 2.
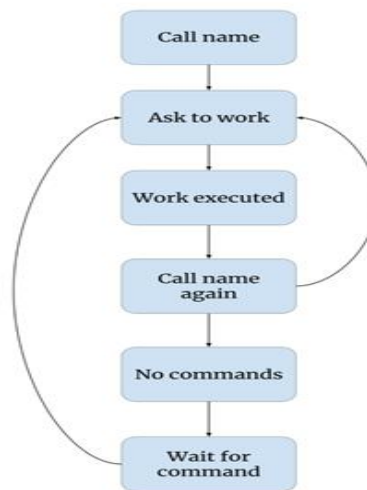

Fig 2: Working model

Figure 2 Alt Text: The prototype is first call by their name then assign some work do to that, use a task executor inside the prototype reply for the corresponding work. Then wait for next command, this is the work flow of virtual assistant.

IV. MODULES USED

The FRIDA prototype are support various modules,

1. Pyttsx3 and speech recognition module: FRIDA is designed in the way of three parts combined - speaking, speech recognition and task execution. On the second hand pyttsx3 is the module for speaking, this module in Python for speaking activities like if speak to the FRIDA it will speak back to us for this thing by using pyttsx3module and on the other hand, using speech recognition, this module is used for recognising our speech and getting our speech into text.
2. Wikipedia: This module based on getting information from Wikipedia. For example if ask about can you give me the information about Abdul Kalam Wikipedia then it will search in Wikipedia

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and get the information about Abdul Kalam and in return it will say the information about Abdul Kalam, it found in Wikipedia

3. Web-browser: web browser is just used for reading information online and it is also used for opening files online and opening files in offline in this prototype. For example opening a file in file folder in FRIDA too. For example: want to use a web browser module, use it for opening files in offline and online to like if want to open apple.com that can open apple.com.

4. OS: OS module kind of a module which is used for providing the inbuilt functions in the computer in Python.

5. Numpy: Numpy module is used for accessing the cameras detect objects and machine learning concepts in Python For example: want to use camera to detect any objects, use open cv in Python but also in order to access the open cv, need the extra module of numpy module.

6. Time: Time module is a module used for accessing inbuilt functions in Python.

7. Sound device: Sound device module is just used for recording human voice and any other sounds in the surroundings in Python in the prototype as in wav file and act as according to that.

8. Opencv: Opencv module is used for accessing webcams and detecting objects which is already programmed. In FRIDA, using open cv module for accessing CCTV cameras to alert the owner of the house who is arriving at the entrance of house and give a picture of them through FRIDA app.

V. VARIOUS FEATURES IN FRIDA

The FRIDA prototype is sustaining many applications using raspberry pi. The figure 3 explains how raspberry pi performing various applications by using software module along with supporting hardware.
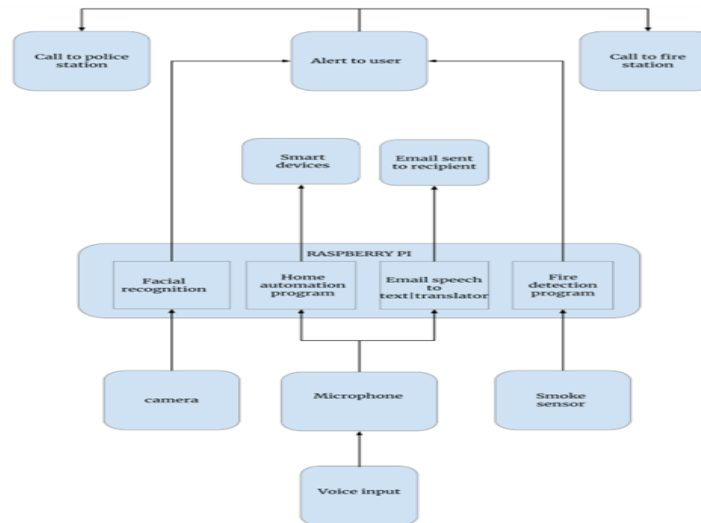

Fig 3: Features in FRIDA

Figure 3 Alt Text: Four essential features of FRIDA are Facial recognition, Home automation, Email translation and fire detection functions; to perform this Raspberry pi, camera, microphone and smoke sensor are used.

Some more features done by FRIDA are given below,

1. Can send emails to designated members (mother, father, etc) by first recording voice then converting it to text.
2. Can send translated emails from any language to English through voice
3. Can set remainders for the day
4. Searching the internet for instructions and information
5. Can give weather information
6. Can make to-do lists
7. Can tell specific categories of news
8. Playing music/podcasts/audio books
9. Can remotely access any computer or any system through Bluetooth or Wi-Fi to open any websites.
10. In this prototype users don't have to use any particular keyword for the execution of a command. But can use related words for the keywords for its execution

VI. RESULTS AND DISUSSION

(a)Speech recognition system:

If the user speak something it will ask what they are saying and get it into the speech recognition system and change the speech into text if the text containing its name then it will execute then check the text for what they are expecting from it and then will execute the command if it can else it will say I cannot do that now but it will store it in its mind and then it can do the work they asked before. The figure 4 shows the python code to implement speech recognition system.

```python
import speech_recognition as sr
import pyaudio
def gncmd():
    micro=sr.Recognizer()
    with sr.Microphone() as source:
        sound=micro.listen(source)

    try:
        query=micro.recognize(sound)
        print("user said:",query)
    except:
        return "None"
    return query

if __name__=="__main__":
    while True:
        query=gncmd().lower()
```

Fig 4: Speech recognition using python

Figure 4 Alt Text: The program explains the listening and recognizing the speech of various people.

For example 1:

Case 1: if say "FRIDA what is the temperature in Madurai?"
Ans: "the temperature in Madurai is 25 degrees celcius"

Case 2: If say, "Tell me temperature in Madurai"
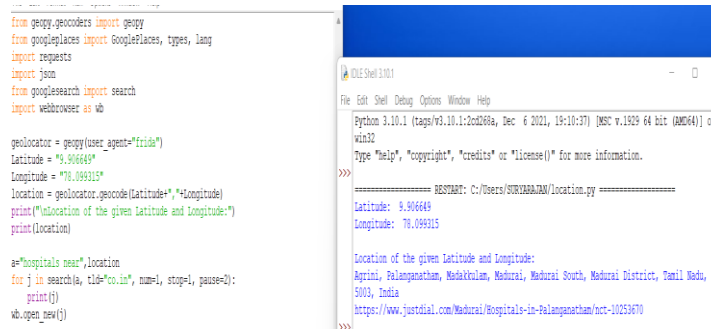Ans: no output.

Fig 5: For example (Result from python code)

Figure 5 Alt Text: This example shows good morning tell by FRIDA.

(b)Locations and directions

If the user asks for any hospital or any other places near him FRIDA will guide them through this code but it will send link to app. By touching the link in the program shown in the figure 6, can get to know the list of hospitals near our location. The figure 6 shows the python code for location and direction finding application.

Fig 6: Location finding using python

Figure 6 Alt Text: It explains the python code for location and direction finding application. Provide the latitude and longitude of the searched location and to get the list of hospitals nearer to our location

Fig 7: For example 1(Result from python code)

Figure 7 Alt Text: If the user asks address for any particular location FRIDA will direct them to the location.

Fig 8: For example 2: (Result from python code)

Figure 8 Alt Text: It can also give you the address of the nearest hospital, mall, etc.

(C) AI-controlled webcam

Webcam with can be controlled using Wi-Fi, it can detect the user's face and even the people residing in their home. It can give an alert to the user if anyone other than the members of the home is cited by the camera.

```
import cv2
face_cascade = cv2.CascadeClassifier('haarcascade_frontalface_default.xml')
cap = cv2.VideoCapture(0)
while 1:
    ret, img = cap.read()
    gray = cv2.cvtColor(img, cv2.COLOR_BGR2GRAY)
    faces = face_cascade.detectMultiScale(gray, 1.3, 5)

    for (x,y,w,h) in faces:
        cv2.rectangle(img,(x,y),(x+w,y+h),(255,255,0),2)
        roi_gray = gray[y:y+h, x:x+w]
        roi_color = img[y:y+h, x:x+w]

    cv2.imshow('img',img)
    k = cv2.waitKey(30) & 0xff
    if k == 27:
        break
cap.release()
cv2.destroyAllWindows()
```
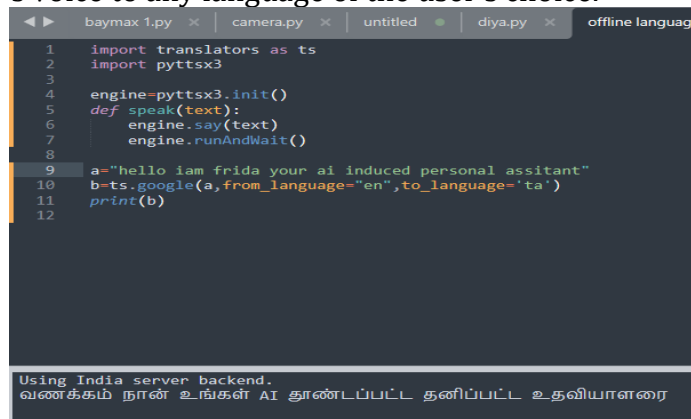
Fig 9: Program for face detection

Figure 9 Alt Text: It shows the python code for face detection using webcam, RBG based face detection with the help of key terms such as read, show and gray functions. Webcam with can be controlled using Wi-Fi, it can detect the user's face and even the people residing in their home.

(D)Language translation

It can translate the user's voice to any language of the user's choice.

```
1   import translators as ts
2   import pyttsx3
3
4   engine=pyttsx3.init()
5   def speak(text):
6       engine.say(text)
7       engine.runAndWait()
8
9   a="hello iam frida your ai induced personal assitant"
10  b=ts.google(a,from_language="en",to_language='ta')
11  print(b)
12
```

```
Using India server backend.
வணக்கம் நான் உங்கள் AI தூண்டப்பட்ட தனிப்பட்ட உதவியாளரை
```

Fig 10: Language translation using python code

Figure 10 Alt Text: It shows the python code for Language translation, for performing language translation in raspberry pi have to mention "from" language and "to" language for converting into receiver side understandable language.

Some more assistant features are done by FRIDA; the results are given in the figure 11.

```
sir it is 9:00 time for your grandmother to take medicine i'll ring alarm(music plays)

Frida call muthu
calling....
call connected

frida send message to friend that i love her
mail sent successfully sir

sir someone has arrived home i'll ring alarm(music plays)

Frida switch on light 1
light 1 on
```

Fig 11: Additional features in FRIDA

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Figure 11 Alt Text: Additional task performed by FRIDA such as call connection, mail transfer, alarm ring, switch on the light and fan are exposed.

Main application of FRIDA such as speech recognition by having no any compulsions to use any keyword can use any word related to the particular execution is mentioned in the figure 11.

Fig 12: Hardware set of FRIDA

Figure 12 Alt Text: Hardware set up consists of Raspberry pi (single-core processor with 512MB RAM), Seed studio 2 mic pi hat, Speaker (1 watt) and Headphone in the figure 12. Recognition of speech is done in the figure 12 along with supporting software and hardware.

FRIDA provide simple structure compare to other portal assistant and also use own chrome it is personally created so don't have any need to pay any royalty to any companies like Google, Bing, etc. The main component of this device is a raspberry pi.

VIII. CONCLUSION

In this work, a portable virtual assistant named as FRIDA based on artificial intelligence are designed to satisfy our basic requirements on needed area. And also specific and separate chrome used to perform this, so easy and quickly way to get the results. The python coding language and Raspberry pi are very much helpful to implement this robotic assistant prototype.

FUTURE WORK

FRIDA was primarily developed as just a program but our future work is make own CLOUD for its database and to work on commands that are going to be developed.

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