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Assistant Vehicle For Elderly People Using Zero UI Technology

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ABSTRACT -The prototype of a smart robotic personal assistant car based on Zero-UI technology is shown in this study. Sensory experiences are used in Zero UI. To operate the devices, you can use gestures, voice, and movement. In this study, a voice-controlled robot vehicle performs three functions: the robot's movement is controlled by the user's voice; the robot's movement is controlled by the user's voice; and the robot's movement is controlled by the user It can understand and articulate text from a variety of sources, including voice commands. Optical character recognition was used to capture the image, and it was then shown. the user with similar sounds via a built-in speaker or It is a voice-activated headset that accepts and processes the user's commands. For any question processing, the Google Assistant API uses the built-in speaker or headset to provide information found on the Internet to the user in audio form. This robot's personal assistant. The assistance vehicle serves as a replacement for screen-based communication. Zero UI is used to operate the system. We use two DC motors to build the robot's wheels, a webcam with built-in microphone, a headset, and a Raspberry Pi board in addition to the Raspberry Pi board. This robotic personal assistant will be implemented using a motor driver IC. vehicle. By delivering voice commands to the robot helper, this method allows visually impaired people to gain access to relevant information in the public realm. The robot could be made into a wheelchair for physically disabled people. The Python programming language is used to create software code.

KEYWORDS:Robotic Personal Assistant Vehicle, Zero-UI Technology, Optical Character Recognition Tool, Google Assistant API, Python Programming, java programming, c programming.

I. INTRODUCTION

The younger and older generations have both increased their usage of computing and smart mobile devices in the previous two decades, or since the beginning of the twenty-first century. This is mostly due to developments in Very Large-Scale Integration (VLSI) technology, which has resulted in a reduction in the cost and size of computing and smart mobile devices. Many people nowadays use internet-enabled gadgets such as smart phones and computers for a variety of purposes such as knowledge sharing, entertainment, and commerce. So it's rare to encounter someone who isn't interacting with a screen, and everything around us will be screened in the not-too-distant future. This can have a variety of effects on an individual, creating a barrier between the user and reality. Zero-UI Our motions, voice, and hand movements are all available to technology. an input to a computer system There are three components to every voice command system. Basic elements, i.e. query for speech to text converter Text-to-speech converter and processor This study presents a prototype of a voice-controlled robotic personal assistant vehicle that can assist a person with a variety of chores. It is made up of three parts in particular: a robot, a computer, and a human. Optical character recognition, Google Assistant-based query search, and control (OCR). Voice instructions are used to control the robot's movements. Using Google Assistant, you may issue voice commands. This allows the user to access information such as world news, Wikipedia, and many other resources. OCR is implemented utilizing a USB webcam, which can be useful for vision impaired people.

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II. RELATED WORK

Vanitha and her colleagues have created a mobile robot that uses Raspberry Pi to regulate terrorist assaults around the world. Through the Internet of Things, the robot may be monitored from anywhere using any web browser (IoT). To detect changes in the surveillance area, the robot features a PIR sensor, a camera, and a smoke sensor. An alarm [1] is used to notify the user. Harshitha and Hussain created a surveillance robot for the home using Raspberry Pi and IoT. This robot has a camera that can recognise faces and transmit video. The camera begins video streaming and sends a notification to the authorised persons as soon as the trespasser is identified by the camera [2]. With the use of an android application, Ashish Bokade and Ratnaparkhe have created a wireless robot for surveillance. This programme launches a web page with a video streaming scree and controls for controlling the robot's motions and the camera.
The video is streamed in MJPG format and sent through an HTTP session [3]. Sathya Prabha and colleagues used Raspberry Pi to create smart cloud robots. This robot collects data on temperature, humidity, and air quality, as well as GPS locations, and uploads it to the cloud. The Arduino is used to control the robot, while the Raspberry Pi is used to communicate with the cloud. The information saved in the cloud, which can be viewed through a web browser, allows a person to learn about environmental changes in a specific location [4]. Bhuvaneswari et al. Have proposed using the Raspberry Pi to create an autonomous outdoor wall painting robot. In hazardous areas, this robot reduces manual labour and human exposure. A simple Python software controls this robot, which has been trained to function without error [5].

III. PROPOSED ALGORITHM

A. *Design Considerations:*

- The proposed system consists of USB webcam with an inbuilt microphone, headset connected to the audio jack of Pi, L293D motor driver IC used for driving the robot wheels (DC motors), and a battery.
- The robot vehicle movement is controlled using appropriate voice commands in four directions, viz. left, right, forward and backwards.
- The webcam is used to capture images or poster.
- The text information in the image is then read using optical character recognition and can be heard by the user through the headset.
- A loudspeaker can be used in place of headset. Specific voice commands given by the user are used for query search making use of Google Assistant API.
- The robotic assistant implemented in this project is a model for a smart robotic wheel chair (vehicle) designed for physically disabled and visually impaired people.

Advantages:

- Useful to the visually impaired persons
- Voice command using Google Assistant

The algorithm LSA consists of three major steps:

1. OCR

Recognition of Text in Captured Webcam Image using OCR

Working of LSA:

- The ESP32 wifi camera captures the image when the robot starts searching for medicine.
- The captured image is sent to the server for processing and using OCR text is extracted and if the recognised medicine has to be taken at that time, robot picks that medicine and provide to the patient.

IV. PSEUDO CODE

```
from PIL import Image
import pytesseract
```

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```
import numpy as np
import requests
import shutil
import time
from PIL import Image
import pytesseract
import numpy as np
def detect_medicine(filename):
    img1 = np.array(Image.open(filename))
    text = pytesseract.image_to_string(img1)
    return text
def download():
url = 'http://192.168.43.40/capture'
file_name = '1.png'

    res = requests.get(url, stream = True)
    if res.status_code == 200:
        with open(file_name,'wb') as f:
shutil.copyfileobj(res.raw, f)


print('Image sucessfully Downloaded: ',file_name)
    else:
print('Image Couldn\'t be retrieved')
download()
while True:
download()
    filename = '1.png'
    img1 = np.array(Image.open(filename))
    text = pytesseract.image_to_string(img1)
    print(text)
time.sleep(5)
```

V. SIMULATION RESULTS

THE THREE FUNCTIONS CARRIED OUT BY THE SMART VOICE CONTROLLED ROBOT PERSONAL ASSISTANT VEHICLE ARE DISCUSSED HERE.

1. *Robot Vehicle Movement Control*

Predefined spoken instructions are used to control the robot vehicle's movement, as shown in Table II. The user issues vocal commands through the webcam's built-in microphone. The built Python application transforms the voice commands into text letter outputs such as "F", "B", "L", "R", and "S", which are then sent to the Raspberry Pi to drive the motors connected to the robot vehicle's wheels as shown in Table II.

TABLE I. VARIOUS COMMANDS USED FOR CONTROLLING THE ROBOT VEHICLE

Voicecommandinput	Pythonprogramoutput	RobotVehicleAction
Forward	F	Forwardmovement
Backward	B	Backwardmovement
Right	R	Rightmovement
Left	L	Leftmovement
Stop	S	Stop
Capture	C	RobotstopsandCapturesimageusing thewebcam

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2. *Using OCR, recognize text in a captured webcam image and convert it to an audio file that can be played by the user.*

When the user says "Capture," the robot comes to a halt, captures the webcam's view, and sends the picture file (.png) to the Raspberry Pi. The developed Python application uses an OCR tool to extract plain text (.txt) from the taken image, and then converts the retrieved text file to an audio file (.mp3). Through the headset, the user hears an audio file that corresponds to the text in the captured image. The given procedure makes use of the Python Google text to speech library (gTTS), Pytesseract library, and Pygame library. To avoid any trash frames, the first 20 frames are skipped, and the computer considers the data from the 21st frame onwards. Figure 8 shows a sample image captured by the camera.

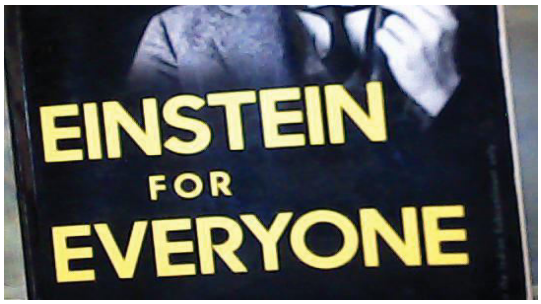

Fig. 1. Snapshot of an image captured by the webcam installed on the Smart Robotic Personal Assistant Vehicle

As illustrated in Fig.10, the audio file (reader.mp3) that corresponds to the text of image.png in audio form is saved in the target folder 'jhansi'.

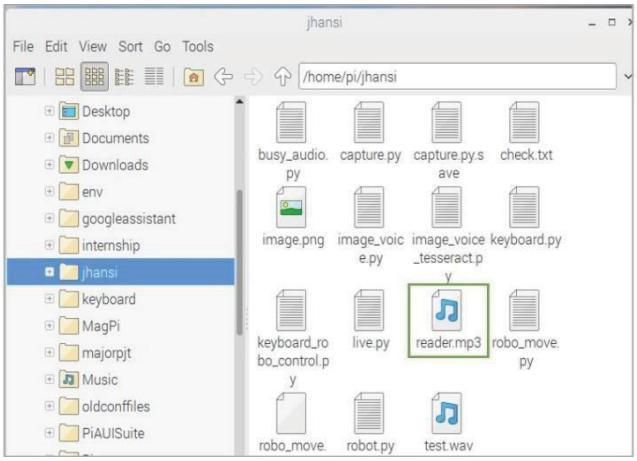

Fig. 2. Generated Audio file "reader.mp3" in the Destination folder

Fig. 3. PuTTY window showing the processing of captured image

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VI. CONCLUSION AND FUTURE WORK

This project uses a Raspberry Pi-based Voice Controlled Robotic Personal Assistant car. This robot moves in all four directions thanks to the user's voice commands. As a result, it can be considered a robot vehicle.This robot car also does intelligent tasks such as recording the user's camera view when required, extracting the text from the acquired image, and playing the related audio to the user. This situation is beneficial to visually challenged individuals who are unable to read signs or other posters accurately.A personal assistant is the third role that this smart robot vehicle can do. This is accomplished by utilizing the Google Assistant API, which can offer the user with relevant information from the internet.

This is extremely useful for physically challenged persons since it helps them to learn from the resources available on the Internet. Artificial intelligence algorithms and a larger number of databases can be used to create an optimal system for a broad query search.As a result, this low-cost prototype of a voice-controlled robot helper vehicle offers a variety of functions for the user's comfort and may be turned into a wheelchair with the application of necessary hardware.

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