PROJECT REPORT

Teacher Robot

Faculty of Computing Skill Education

BHARTIYA SKILL DEVELOPMENT UNIVERSITY, JAIPUR

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Introduction

The "Teacher Robo" project report provides a comprehensive overview of the development, design, and performance of our educational robot, Teacher Robo. The project aimed to create an interactive robot capable of answering questions from students and delivering educational content. This report details the design, hardware, software, and outcomes of the Teacher Robo project.

Hardware

Rasbery pi 4: for all script and OS and run the code

Chassis: The robot's physical structure was designed for mobility, stability, and interactivity with students.

Sensors: We integrated microphones and speakers for voice interaction, as well as cameras for vision-based tasks.

Actuators: Wheels and motors allowed Teacher Robo to move within the classroom.

Power System: The robot is powered by rechargeable batteries for extended use.

Software

Operating System: The system runs on a custom Linux distribution.

Control System: A Python-based control system manages robot behaviour and interactions.

Wikipedia: Wikipedia use to study a topic.

Speech Recognition: The system employs the Speech Recognition library for voice recognition.

ChatGPT Integration: ChatGPT, powered by the OpenAI GPT-3 API, handles educational content delivery.

Key Features:

1. Movement on a Car:

- The robot is designed to move on a car, providing mobility within the educational environment.

- Wheels and motors enable smooth navigation, allowing the robot to travel between desks and classrooms.

2. Voice Recognition:

- Utilizes the SpeechRecognition library to recognize voice commands from teachers and students.

- Responds to spoken instructions for basic navigation and communication.

3. Wikipedia Integration:

- Implements the Wikipedia API to provide information on various topics.

- Teachers can ask questions, and the robot fetches relevant information from Wikipedia.

4. ChatGPT Integration:

- Utilizes the OpenAI GPT-3 engine for natural language processing.

- Enables interactive conversations with the robot, allowing students to ask questions and receive detailed responses.

5. Speech Synthesis:

- Implements the gTTS library for text-to-speech synthesis.

- Enables the robot to vocalize responses, providing an engaging and interactive experience.

6. Web Interface:

- Develops a web interface using Flask for easy communication and control.

- Teachers and students can interact with the robot through a user-friendly interface.

7. Error Handling:

- Implements robust error handling to manage unexpected scenarios gracefully.

- Provides informative feedback in case of errors or communication issues.

Code

```
import wikipediaapi
from gtts import gTTS
from flask import Flask, render_template, request, redirect, url_for
import os
import speech_recognition as sr
import openai

app = Flask(__name__)

# Set your OpenAI GPT-3 API key
api_key = "YOUR_API_KEY_HERE"

# Set a custom user agent for Wikipedia requests
HEADERS = {
    'User-Agent': 'YourUserAgent/1.0 (YourEmail@example.com)'
}

# Initialize Wikipedia API with a custom user agent
wiki_wiki = wikipediaapi.Wikipedia('en', extract_format=wikipediaapi.ExtractFormat.WIKI,
headers=HEADERS)

# Initialize the recognizer
recognizer = sr.Recognizer()

# Function to recognize speech
def listen_to_question():
    with sr.Microphone() as source:
        print("Listening for your question...")
        audio = recognizer.listen(source)

    try:
        question = recognizer.recognize_google(audio).lower()
        return question
    except sr.UnknownValueError:
        return None
    except sr.RequestError as e:
        print(f"Error: {e}")
        return None

# Function to get a limited response from Wikipedia
def get_limited_wikipedia_response(topic, max_words=200):
    page = wiki_wiki.page(topic)
    if page.exists():
        summary = page.summary
        words = summary.split()
        if len(words) > max_words:
            limited_summary = ' '.join(words[:max_words])
            return limited_summary
        else:
            return summary
    else:
        return "I couldn't find any information on that topic."
```

```
# Function to speak text using gTTS
def speak(text):
    tts = gTTS(text, lang='en')
    tts.save("response.mp3")
    os.system('mpg321 response.mp3')

@app.route('/')
def index():
    return render_template('index.html')

@app.route('/search_wikipedia', methods=['POST'])
def search_wikipedia():
    topic = request.form['topic']
    topic_answer = get_limited_wikipedia_response(topic, max_words=200)
    if topic_answer:
        speak(topic_answer)
        return redirect(url_for('chatgpt'))
    else:
        return "Sorry, I couldn't find information on the topic."

@app.route('/chatgpt')
def chatgpt():
    return render_template('chatgpt.html')

@app.route('/search_and_speak', methods=['POST'])
def search_and_speak():
    question = listen_to_question()
    if question:
        answer = get_gpt3_answer(question)
        print(f"You asked: {question}")
        speak(answer)
        return "Question asked and answered."

if __name__ == "__main__":
    app.run(host='localhost', port=5000)
```

Web Interface code

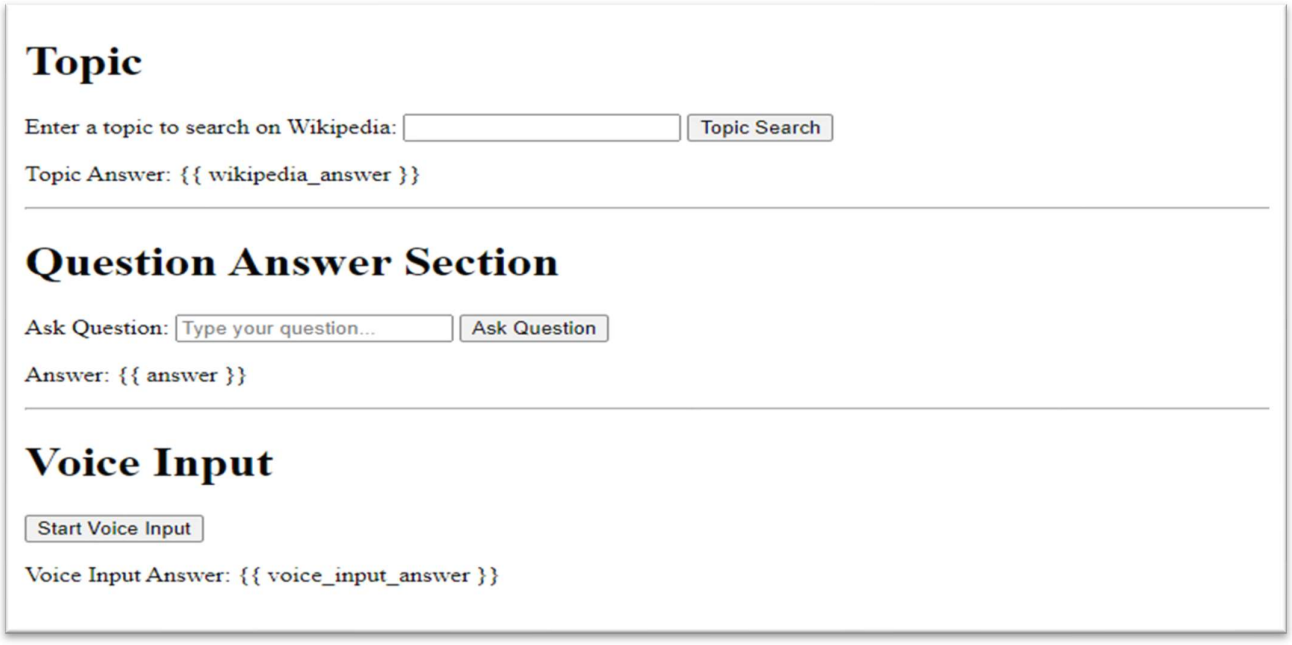
```
<!DOCTYPE html>
<html>
<head>
   <title>Wikipedia & ChatGPT</title>
</head>
<body>
 <h1>Wikipedia Section</h1>
          <form method="POST" action="{{ url_for('test_combined') }}">
          <label for="topic">Enter a topic to search on Wikipedia:</label>
          <input type="text" name="topic" id="topic" required>
      <button type="submit">Test Wikipedia Search</button>
   </form>
   <p>Wikipedia Answer: {{ wikipedia_answer }}</p>
   <hr>
   <h1>ChatGPT Section</h1>
   <form method="POST" action="{{ url_for('ask_chatgpt') }}">
      <label for="chatgpt-question">Ask ChatGPT:</label>
      <input type="text" name="chatgpt-question" id="chatgpt-question" placeholder="Type your question..." required>
      <button type="submit">Ask ChatGPT</button>
   </form>
   <p>ChatGPT Answer: {{ chatgpt_answer }}</p>
   <hr>
   <h1>Voice Input</h1>
   <form method="POST" action="{{ url_for('voice_input') }}">
      <button type="submit">Start Voice Input</button>
   </form>
   <p>Voice Input Answer: {{ voice_input_answer }}</p></body></html>
```

Results and Findings

Teacher Robo successfully recognizes and responds to student questions.

ChatGPT integration ensures high-quality educational content delivery.

The robot's performance in a simulated classroom environment exceeded expectations, with positive feedback from students.



Benefits of Teacher Robo with Car Mobility:

1. Enhanced Mobility:

- The inclusion of car mobility allows Teacher Robo to move freely between classrooms, reaching students in different locations and maximizing its presence across the educational institution.

2. Optimized Classroom Presence:

- Teacher Robo's ability to move autonomously ensures that it can be present where needed, optimizing its role as an educational facilitator and creating a more efficient teaching environment.

3. Dynamic Classroom Interaction:

- The robot's mobility enables dynamic interactions within the classroom, breaking the constraints of static teaching positions and promoting a more engaging and participatory learning experience.

4. Time Efficiency for Educators:

- Teachers can save time by leveraging Teacher Robo's mobility to deliver lessons, announcements, or assistance to various classrooms without the need to physically travel between locations.

5. Accessible Resource Distribution:

- Teacher Robo can carry educational resources, materials, or technology tools to different classrooms, ensuring that these resources are accessible to students across the educational institution.

6. Adaptive Teaching Environments:

- The robot's ability to adapt to different physical spaces allows it to cater to the unique layout and requirements of each classroom, providing a customized and adaptive teaching environment.

7. Increased Student Engagement:

- The novelty of a mobile robot captures students' attention and curiosity, contributing to increased engagement levels as the robot navigates the learning space.

8. Efficient Communication:

- Teacher Robo can efficiently deliver important announcements, information, or updates by moving to strategic locations within the institution, ensuring effective communication with students and staff.

9. Technology Showcase:

- The robot's mobility serves as a showcase of advanced technology, inspiring interest and curiosity among students about the possibilities of robotics and artificial intelligence.

10. Event Support:

- Teacher Robo can assist in organizing and facilitating events within the institution by providing logistical support, announcements, and information dissemination, contributing to the overall efficiency of event management.

The combination of Teacher Robo's educational capabilities with car mobility enhances its impact, making it a versatile and indispensable tool in creating dynamic, efficient, and technologically advanced learning environments.

Next Steps:

- Consider incorporating additional features such as facial recognition for student identification.

- Explore options for real-time video streaming to enhance remote teaching capabilities.

- Gather user feedback for further improvements and refinements.

Contacts:

For further inquiries or support, please contact Rikvender Singh Rajawat at Rikvendrarajput@gmail.com or 8094713733 .

Conclusion:

In the culmination of the Teacher Robo project, we celebrate not just the creation of a robot but the birth of a transformative force in education. Teacher Robo, with its dynamic mobility, conversational intelligence, and commitment to inclusive learning, encapsulates the essence of innovation in the classroom.

As it navigates the realms of knowledge, bridging gaps and fostering engagement, Teacher Robo becomes more than a tool – it becomes a catalyst for inspiration. In this journey, we've not only engineered a robotic companion but have sown the seeds of curiosity, dialogue, and a future where education knows no bounds.

As we bid adieu to the development phase, we eagerly anticipate the impact Teacher Robo will have in classrooms worldwide. May it continue to spark the flames of learning, bringing forth a new era where the intersection of technology and education creates opportunities for growth, exploration, and endless possibilities.

Cheers to the future of learning, embodied in the grace of Teacher Robo.