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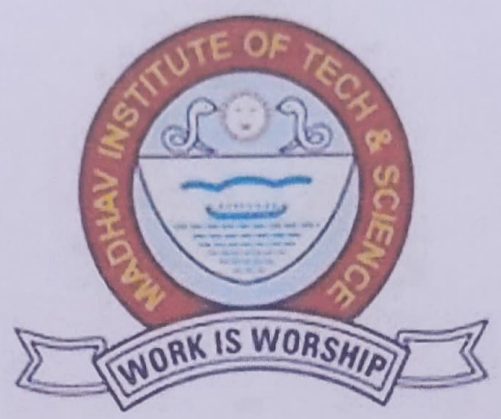

Project Report

on

Video-Chat App

Submitted By:

Harsh Vardhan Singh Gahlot

0901CS191039

Faculty Mentor:

Mr. Mir Shahnawaz Ahmad

Assistant Professor, Computer Science and Engineering

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE
GWALIOR - 474005 (MP) est. 1957

MAY-JUNE 2022

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Video-Chat App

A project report submitted in partial fulfillment of the requirement for the degree of

BACHELOR OF TECHNOLOGY

In

COMPUTER SCIENCE AND ENGINEERING

Submitted By:

Harsh Vardhan Singh Gahlot

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Faculty Mentor:

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Submitted to:

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CERTIFICATE

This is certified that **Harsh Vardhan Singh Gahlot** (0901CS191107) has submitted the project reporttitled **Video-Chat App** under the mentorship of **Mr. Mir Shahnawaz Ahmad,** inpartial fulfillment of the requirement for the award of degree of Bachelor of Technology in Computer Science and Engineering from Madhav Institute of Technology and Science, Gwalior.

09/05/22

Mr. Mir Shahnawaz Ahmad
Faculty Mentor
Assistant Professor
Computer Science and Engineering

09/05/22

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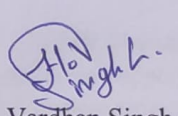
DECLARATION

We hereby declare that the work being presented in this project report, for the partial fulfillmentof requirement for the award of the degree of Bachelor of Technology in Computer Science and Engineering at Madhav Institute of Technology & Science, Gwalior is an authenticated and original record of my work under the mentorship of **Mr. Mir Shahnawaz Ahmad**, **Assistant Professor**, Computer Science and Engineering.

We declare that we have not submitted the matter embodied in this report for the award of any degree or diploma anywhere else.



Harsh Vardhan Singh Gahlot
0901CS191039
3rd Year
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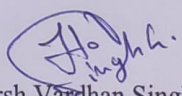
The full semester project has proved to be pivotal to my career. I am thankful to my institute, **Madhav Institute of Technology and Science,** for allowing me to continue my disciplinary project as a curriculum requirement, under the provisions of the Flexible Curriculum Scheme (based on the AICTE Model Curriculum 2018), approved by the Academic Council of the institute. I extend my gratitude to the Director of the institute, **Dr. R. K. Pandit** and Dean Academics, **Dr. Manjaree Pandit** for this.

I would sincerely like to thank my department, **Department of Computer Science and Engineering, for allowing** me to explore this project. I humbly thank **Dr. Manish Dixit**, Professor and Head, Department of Computer Science and Engineering, for his continued support during the course of this engagement, which eased the process and formalities involved.

I am sincerely thankful to my faculty mentors. I am grateful to the guidance of **Mr. Mir Shahnawaz Ahmad**, **Assistant Professor**, Computer Science and Engineering for their continued support and guidance throughout the project. I am also very thankful to the faculty and staff of the department.



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Abstract

Although the technology has passed the horizon, this is still in a developing phase. With the development of technology, the averages of communication are being enhanced. Each day the communication system is growing much faster, secure and efficient. One of the most popular and reliable systems of communication is video chat on Skype, Facebook, Yahoo, etc., through the internet. There are several methods available for communication such as voice calls, text chat, e-mail, mail, etc. Each of them is able of passing the message both thought voice or text, but they can't make two separate faces commonly. With this proposed Online Video Chat app face to face, talking is easy.

Keywords: Video-call, Web-RTC, Sockets, React etc.

सार:

यद्यपि प्रौद्योगिकी ने क्षितिज को पार कर लिया है, यह अभी भी एक विकासशील चरण में है। प्रौद्योगिकी के विकास के साथ, संचार के औसत को बढ़ाया जा रहा है। हर दिन संचार प्रणाली बहुत तेजी से, अधिक सुरक्षित और अधिक कुशल हो रही है। संचार की सबसे लोकप्रिय और विश्वसनीय प्रणालियों में से एक इंटरनेट के माध्यम से स्काइप, फेसबुक, याहू आदि पर वीडियो चैट है। संचार के लिए कई विधियां उपलब्ध हैं जैसे वॉयस कॉल, टेक्स्ट चैट, ई-मेल, मेल इत्यादि। उनमें से प्रत्येक आवाज या टेक्स्ट दोनों के माध्यम से संदेश भेजने में सक्षम है, लेकिन वे आम तौर पर दो अलग-अलग चेहरे नहीं बना सकते हैं। इस प्रस्तावित ऑनलाइन वीडियो चैट ऐप के साथ आमने-सामने बात करना आसान है।

कीवर्ड: वीडियो-कॉल, वेब-आरटीसी, सॉकेट, रिएक्ट आदि।

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CHAPTER 1: PROJECT OVERVIEW

1.1 Introduction

The demand for social networking sites is increasing day by day. A social networking site that allows you to video chat online is the primary inspiration for my project.

The goal of my project is to build an online video chatting tool that enables users to join real-time streaming video chat rooms where users can share their video with multiple users. Users can send instant messages and share their live web cam data to other users in the chat room. My online video chatting tool will allow users to interact more privately. It will also support multi-user video conferencing.

Some of the existing video chat applications are Zoom, Google meets, Microsoft teams. My online video chat tool offers similar functionality like these social networking sites, and it is simple to execute and doesn't have to rely on any third party sites. Users can directly enter make a call using other person's one time id. Also this video chat application doesn't require any additional software installation on the client side. The main technologies used in this project are React and Web-RTC.

Although the technology has passed the horizon, this is still in a developing phase. With the development of technology, the averages of communication are being enhanced. Each day the communication system is growing much faster, secure and efficient. One of the most popular and reliable systems of communication is video chat on Skype, Facebook, Yahoo, etc., through the internet.

There are several methods available for communication such as voice calls, text chat, e-mail, mail, etc. Each of them is able of passing the message both thought voice or text, but they can't make two separate faces commonly. With this proposed Online Video Chat app face to face, talking is easy.

1.2 SOFTWARE REQUIREMENTS SPECIFICATION

1.2.1 Hardware Requirements

- PC with 256GB or more Hard Disk.
- PC with 4GB RAM.
- PC with Intel i3 and above.

1.2.2 Software Requirements

- Operating System: Windows 10
- Languages: ReactJS, NodeJS
- Technologies: Web-RTC, socket.io

CHAPTER 2: IMPLEMENTATIONS

2.1Frontend

2.1.1 HTML

Hypertext Markup Language (HTML) is the standard markup language for documents designed to be displayed in a web browser. It can be assisted by technologies such as Cascading Style Sheets (CSS) and scripting languages such as JavaScript. Web browsers receive HTML documents from a web serveror from local storage and render the documents into multimedia web pages. HTML describes the structure of a web page semantically and originally included cues for the appearance of the document.

HTML elements are the building blocks of HTML pages. With HTML constructs, images and other objects such as interactive forms may be embedded into the rendered page. HTML provides a means to create structured documents . HTML elements are delineated by tags, written using angle brackets. Tags such as <img /> and <input /> directly introduce content into the page. Other tags such as <p> surround and provide information about document text and may include other tags as sub-elements.

HTML can embed programs written in a scripting language such as JavaScript, which affects the behavior and content of web pages. Inclusion of CSS defines the look and layout of content.

2.1.2 CSS

Cascading Style Sheets (CSS) is a style sheet language used for describing the presentation of a document written in a markup language like HTML. CSS is a cornerstone technology of the World Wide Web, alongside HTML and JavaScript.CSS is designed to enable the separation of presentation and content, including layout, colors, and fonts. This separation can improve content accessibility, provide more flexibility and control in the specification of presentation characteristics, enable multiple web pages to share formatting by specifying the relevant CSS in a separate .css file, and reduce complexity and repetition in the structural content.

CSS information can be provided from various sources. These sources can be the web browser, the user and the author.The information from the author can be further classified into inline, media type, importance, selector specificity, rule order, inheritance and property definition. CSS style information can be in a separate document or it can be embedded into an HTML document. Multiple style sheets can be imported. Different styles can be applied depending on the output device being used; for example, the screen version can be quite different from the printed version, so that authors can tailor the presentation appropriately for each medium. The style sheet with the highest priority controls the content display. Declarations not set in the highest priority source are passed on to a source of lower priority, such as the user agent style. The process is called cascading.

2.1.3 JavaScript

JavaScript is a high-level, interpreted scripting language that conforms to the ECMAScript specification. JavaScript has curly-bracket syntax, dynamic typing, prototype-based object-orientation, and first-class functions. Alongside HTML and CSS, JavaScript is one of the core technologies of the World Wide Web. JavaScript enables interactive web pages and is an essential part of web applications. The vast majority of websites use it, and major web browsers have a dedicated JavaScript engine to execute it. It has APIs for working with text, arrays, dates, regular expressions, and the DOM, but the language itself does not include any I/O, such as networking, storage, or graphics facilities.

Initially only implemented client-side in web browsers, JavaScript engines are now embedded in many other types of host software, including server-side in web servers and databases, and in non-web programs such as word processors and PDF software, and in runtime environments that make JavaScript available for writing mobile and desktop applications, including desktop widgets.

The terms Vanilla JavaScript and Vanilla JS refer to JavaScript not extended by any frameworks or additional libraries. Scripts written in Vanilla JS are plain JavaScript code.

2.1.4 Bootstrap

Bootstrap is a free and open-source CSS framework directed at responsive, mobile-first front-end web development. It contains CSS- and (optionally) JavaScript-based design templates for typography, forms, buttons, navigation and other interface components. Bootstrap is the third- most starred project on GitHub, with more than 135,000 stars, behind only freeCodeCamp (almost 305,000 stars) and marginally behind Vue.js framework. According to Alexa Rank, Bootstrap getbootstrap.com is in the top-2000 in US while vuejs.org is in top-7000 in US. Bootstrap is a web framework that focuses on simplifying the development of informative web pages (as opposed to web apps). The primary purpose of adding it to a web project is to apply Bootstrap's choices of color, size, font and layout to that project. As such, the primary factor is whether the developers in charge find those choices to their liking. Once added to a project, Bootstrap provides basic style definitions for all HTML elements. The result is a uniform appearance for prose, tables and form elements across web browsers. In addition, developers can take advantage of CSS classes defined in Bootstrap to further customize the appearance of their contents. For example, Bootstrap has provisioned for light- and dark-colored tables, page headings, more prominent pull quotes, and text with a highlight. Bootstrap is a web framework that focuses on simplifying the development of informative web pages (as opposed to web apps). The primary purpose of adding it to a web project is to apply Bootstrap's choices of color, size, font and layout to that project.

2.1.5 React

React is a declarative, efficient, and flexible JavaScript library for building user interfaces. It's 'V' in MVC. ReactJS is an open-source, component-based front end library responsible only for the view layer of the application. It is maintained by Facebook. React uses a declarative paradigm that makes it easier to reason about your application and aims to be both efficient and flexible. It designs simple views for each state in your application, and React will efficiently update and render just the right component when your data changes. The

declarative view makes your code more predictable and easier to debug. A React application is made of multiple components, each responsible for rendering a small, reusable piece of HTML. Components can be nested within other components to allow complex applications to be built out of simple building blocks. A component may also maintain an internal state – for example, a TabList component may store a variable corresponding to the currently open tab.

2.2 Backend

2.2.1 Node

Node.js is an open-source and cross-platform JavaScript run-time environment. It is a popular Tool for almost any kind of project!

- Node.js is an open source server environment
- Node.js is free
- Node.js runs on various platforms (Windows, Linux, Unix, Mac OS X, etc.)
- Node.js uses JavaScript on the server

What Can Node.js Do?

- Node.js can generate dynamic page content
- Node.js can create, open, read, write, delete, and close files on the server
- Node.js can collect form data
- Node.js can add, delete, modify data in your database

As an asynchronous event-driven JavaScript runtime, Node.js is designed to build scalable network applications. In the following "hello world" example, many connections can be handled concurrently. Upon each connection, the callback is fired, but if there is no work to be done, Node.js will sleep.

2.3 Technologies

2.3.1 Web-RTC

- Web-RTC is completely free
- It comes as open source project that has been embedded in browsers but you can take and adopt it for your own needs
- This in turn has created a vibrant and dynamic ecosystem around WebRTC of a variety of open source projects and frameworks as well as commercial offerings from companies that help you to build your products
- Web-RTC constantly evolving and improving, so you need to keep an eye on it.

Web-RTC today is available in all modern browsers. Google Chrome, Mozilla Firefox, Apple Safari and Microsoft Edge support it. You can also “take” it and integrate it into an application or an embedded device without the need of browser at all.

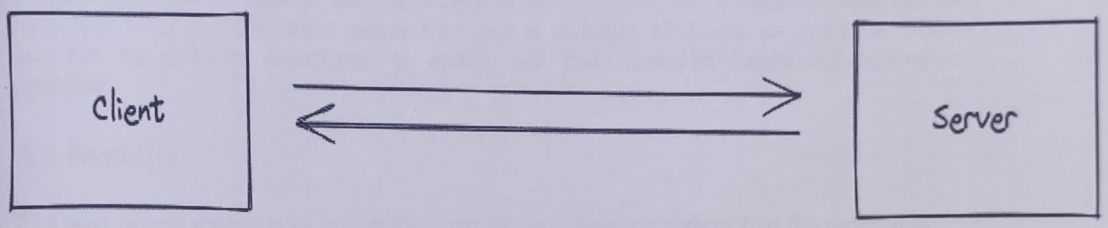
What Web-RTC does is allow the access to devices. You can access the microphone of your device, the camera that you have on your phone or laptop – or it can be a screen itself. You can capture the display of the user and then have that screen shared or recorded remotely.
Whatever it does is in real time, enabling live interactions.

The WebRTC standard covers, on a high level, two different technologies: media capture devices and peer-to-peer connectivity.
Media capture devices includes video cameras and microphones, but also screen capturing "devices".

2.3.2 Socket

Socket.IO is a library that enables **low-latency**, **bidirectional** and **event-based** communication between a client and a server.

Figure: 2.3.2.1



It is built on top of the WebSocket protocol and provides additional guarantees like fallback to HTTP long-polling or automatic reconnection.

Socket.IO primarily uses the WebSocket protocol with polling as a fallback option,[3] while providing the same interface. Although it can be used as simply a wrapper for WebSockets, it provides many more features, including broadcasting to multiple sockets, storing data associated with each client, and asynchronous I/O.

CHAPTER 3: TESTING

3.1 Introduction

In computer programming, unit testing is a software testing method by which individual units of source code, sets of one or more computer program modules together with associated control data, usage procedures, and operating procedures, are tested to determine whether they are fit for use. Intuitively, one can view a unit as the smallest testable part of an application. In procedural programming, a unit could be an entire module, but it is more commonly an individual function or procedure. In object-oriented programming, a unit is often an entire interface, such as a class, but could be an individual method. Unit tests are short code fragments created by programmers or occasionally by white box testers during the development process. It forms the basis for component testing. Ideally, each test case is independent from the others. Substitutes such as method stubs, mock objects, fakes, and test harnesses can be used to assist testing a module in isolation. Unit tests are typically written and run by software developers to ensure that code meets its design and behaves as intended.

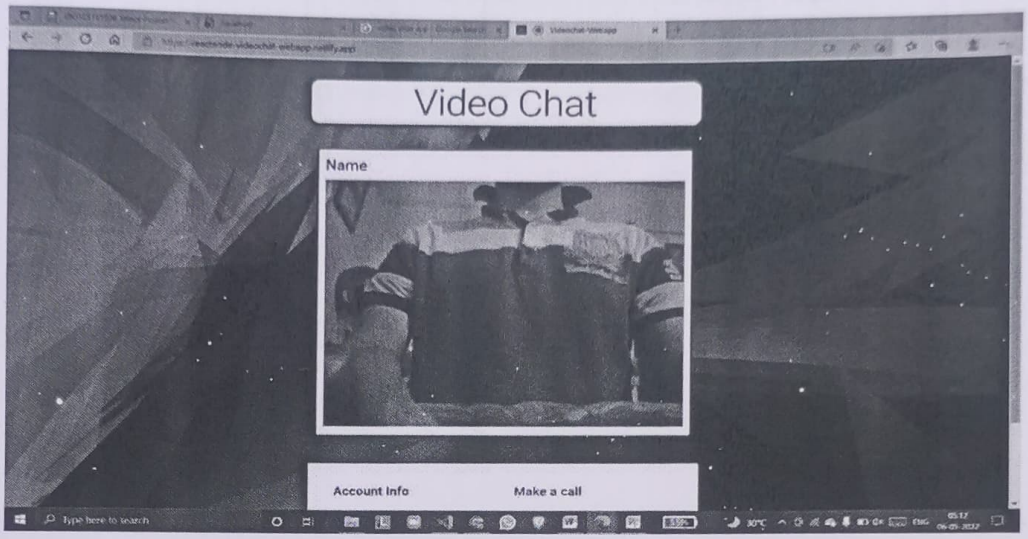
3.2 Benefits

The goal of unit testing is to isolate each part of the program andshow that the individual parts are correct. A unit test provides a strict, written contract that the piece of code must satisfy. As a result, it affords several benefits.

1) **Find problems early:** Unit testing finds problems early in the development cycle. In test-driven development (TDD), which is frequently used in both extreme programming and scrum, unittests are created before the code itself is written. When the
tests pass, that code is considered complete. The same unit tests are run against that function frequently as the larger codebase is developed either as the code is changed or via an automated process with the build. If the unit tests fail, it is considered to be a bug either in the changed code or the tests themselves. The unit tests then allow the location of the fault or failure to be easily traced. Since the unit tests alert the development team of the problem before handing the code offto testers or clients, it is still early in the development process.
2) **Facilitates Change:** Unit testing allows the programmer to refactor code or upgrade system libraries at a later date, and make sure the module still works correctly (e.g., in regression testing). The procedure is to write test cases for all functions and methods so that whenever a change causes a fault, it canbe quickly identified. Unit tests detect changes which may break a design contract.
3) **Simplifies Integration:** Unit testing may reduce uncertainty in the units themselves and can be used in a bottom-up testing style approach. By testing the parts of a program first and thentesting the sum of its parts, integration testing becomes much easier.
4) **Documentation:** Unit testing provides a sort of living documentation of the system. Developers looking to learn whatfunctionality is provided by a unit, and how to use it, can look at the unit tests to gain a basic understanding of the unit's interface (API).Unit test cases embody characteristics that are critical to the success of the unit. These characteristics can indicate appropriate/inappropriate use of a unit as well as negative behaviors that are to be trapped by the unit.

CHAPTER 4: CONCLUSION AND FUTURE SCOPE

4.1 User not on video call:



4.2 User on a video call

The proposed Online Video Chat application can be used as communicate system for face to face interaction. Due to the growing use of an internet-based communication system, the scope of similar applications is getting bigger. It can be used from anywhere by anyone having a net connection.

References

- **https://socket.io/**
  It is an event-driven JavaScript library for real-time web applications. It enables real-time, bi-directional communication between web clients and servers. It has two parts: a client-side library that runs in the browser, and a server-side library for Node.js. Both components have a nearly identical API.

- **https://webrtc.org/**
  WebRTC is a free and open-source project providing web browsers and mobile applications with real-time communication via application programming interfaces.

- **https://reactjs.org/**
  React is a free and open-source front-end JavaScript library for building user interfaces based on UI components. It is maintained by Meta and a community of individual developers and companies.