

# NOVA-CHAT: A FULL-STACK CHAT-BOT USING AI

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**Abstract:** Computers are getting better at talking to people. They can hear what we say and answer our questions.. Sometimes they do not know how we feel. This can make it hard to have a conversation with them. NovaChat is a kind of computer program called a chatbot. It is made to understand how people are feeling. NovaChat can talk to people in languages like English and Hindi and Marathi. NovaChat uses tools to understand what people are saying and how they feel. It can answer questions. Have conversations with people. The people who made NovaChat wanted to build a program that talks to people in a way. They used something called the stack to make it. The people who made NovaChat tested it to see how well it works. NovaChat is good at understanding what people say and how they feel. It is also good, at answering questions and having conversations. NovaChat is a chatbot that can understand people and talk to them in a way.

**IndexTerms** - Chatbot, Sentiment Analysis, Natural Language Processing, Multilingual Communication, MERN Stack, Full-Stack Development.

## I. INTRODUCTION

Computers are becoming increasingly capable of communicating with people. They can understand what is said and respond to questions, but they do not always understand how a person is feeling, which can make conversations difficult. NovaChat is a chatbot designed to address this gap by understanding the emotional state of the people it talks to.

In everyday conversation, people rely on emotional cues to understand one another; they can tell when someone is happy or sad. Computers do not always pick up on these cues. NovaChat is different: it can recognize how people are feeling and respond to their questions in a way that feels natural.

NovaChat is a chatbot that can converse with people in multiple languages. It understands both what people are saying and how they are feeling, functioning much like a program capable of holding a genuine conversation.

## II. NEED OF THE STUDY

People are using communication platforms more and more. This means we need systems that can have conversations with users and understand what they need. We already have chatbots that can give answers and find information but they are not very good at understanding how people feel.

When people talk to chatbots they usually need help. Want to know something. Sometimes they just want someone to talk to. If the chatbot just gives an answer without thinking about how the person feels they might not want to talk to it anymore. This can make the experience bad for the user. Some studies have shown that chatbots that understand emotions can make users trust them more and be happier to talk to them for a time.

Another problem with chatbots is that they usually only speak one language. Lots of people prefer to talk in their language so chatbots need to be able to understand many languages.

We need a system that can understand emotions speak languages and respond quickly. This is why we are making NovaChat. NovaChat is a system that wants to be friendly and easy to use for everyone. It will be able to adapt to languages and understand how people are feeling. NovaChat will be a system that combines emotional intelligence, multilingual support and real-time responsiveness to provide a good experience, for users of NovaChat.

### III. OBJECTIVES OF THE STUDY

The main goals of this research are:

1. To make NovaChat, a chatbot that can talk to people in languages and understand what they mean.
2. To help NovaChat figure out how people are feeling and what they want to say.
3. To make NovaChat respond in a way that makes sense and is sensitive to peoples emotions.
4. To make sure NovaChat can talk to people in languages, like English, Hindi and Marathi so more people can use it.
5. To see how well NovaChat works by checking things, like how accurate it's how easy it is to use.
6. To build NovaChat in a way that's flexible and can be easily updated using the latest technology.
7. To make people like talking to NovaChat by making it seem like they are talking to a person who cares about them. NovaChat is supposed to be a chatbot that people can talk to and it should be able to understand them and respond in a way that's helpful and nice.

### IV. LITERATURE REVIEW

The literature indicates that chatbot technology has advanced significantly across educational and conversational domains. Dale [2] highlighted the increasing importance of chatbots in modern digital communication, while OpenAI's GPT-4 report [3] demonstrated remarkable progress in natural language understanding and generation. Educational chatbots such as Jill Watson [4], QuizBot [7], and Intelligent Mentoring Bots [5] have shown their effectiveness in supporting learning activities and improving accessibility.

Several review studies [1], [8], [11], and [13] emphasize that chatbot systems can enhance user engagement, provide personalized assistance, and improve learning outcomes. However, these studies also reveal persistent limitations related to emotional intelligence, contextual awareness, and multilingual interaction.

Research conducted by Wolff et al. [9], Perez-Marín [10], and Yang & Stansfield [12] further demonstrates that users expect conversational systems to provide more natural and human-like interactions. Existing systems often focus on information retrieval and task completion but lack the ability to understand emotional states and adjust responses accordingly.

NovaChat is a system that can understand how people feel and talk to them in their language. It does this by putting a few different things: it can figure out what people mean when they talk it can tell how they are feeling it can detect the language they are speaking and it can respond in a way that makes sense. This makes NovaChat really good at talking to people and understanding them.

NovaChat is different from chatbots that are used for learning and talking. Those chatbots do not really understand how people feel. They can only talk to people in one language. NovaChat is better because it can talk to people in languages and it can understand their feelings. This makes people like talking to NovaChat more because it is, like talking to a person.

The people who made NovaChat wanted to make a system that could talk to people in a way that feels natural and nice. They wanted NovaChat to be able to understand people and talk to them in a way that's helpful and friendly.

### V. RESEARCH METHODOLOGY

The working of NovaChat consists of several interconnected modules that enable multilingual and emotion-aware conversations.

#### 1. User Input Module

I talk to NovaChat by typing or speaking into the web interface.

Here are some examples:

- "I'm feeling stressed out."
- "Whats Artificial Intelligence?"
- "मला आज खूप आनंद झाला आहे."

#### 2. Language Detection Module

The system automatically figures out the language I'm using like English, Hindi or Marathi. Sends it to the right processing pipeline.

### 3. Emotion Recognition Module

The system tries to understand how I'm feeling, like sad angry excited or neutral.

Here's an example:

Input: "I'm really upset because I failed my test."

Detected Emotion: Sadness

### 4. Intent Recognition Module

The chatbot tries to understand what I want to do like ask a question get help with something or just chat.

### 5. Response Generation Module

Based on the language I'm using how I'm feeling and what I want to do the system comes up with a response that's relevant and helpful.

### 6. Database and Output Module

All my conversations, with NovaChat are stored in MongoDB. The response is shown to me in real time on the frontend interface.

## VI. DATASET AND DATA SOURCES

The NovaChat framework uses different datasets to make sure the system works properly.

### 1. Text Dialogue Dataset

The system uses kinds of conversation datasets like MultiWOZ and Cornell Movie Dialogs. These datasets have lots of ways that people talk to each other and lots of examples of how people interact with each other.

### 2. Speech Dataset

The NovaChat framework uses Mozilla Common Voice to train and test the parts of the system that deal with speech. This dataset has lots of voice recordings from people who speak different languages and have different accents and ways of talking.

### 3. Emotion Dataset

The NovaChat framework uses datasets like ISEAR and EmoBank to figure out how people are feeling. These datasets have lots of examples of people talking about how they feel. They help the system understand emotions.

### 4. User Interaction Dataset

When people use the NovaChat framework the system keeps track of how they interact with it. This helps the NovaChat framework understand how well it is working, how long people talk to it if people are happy with it and what they like to do with it.

### 5. Intent Classification Dataset

The NovaChat framework uses datasets that have different languages to train the parts of the system that figure out what people want to do when they talk to it. The NovaChat framework uses these datasets to understand what people are trying to accomplish when they have a conversation, with it.

## VII. SYSTEM ARCHITECTURE

The NovaChat system is made up of different parts that all work together.

### 1. User Interface Layer

This is the part of NovaChat where you can talk to it using text or your voice. It is built using React.js.

### 2. Language Detection Layer

This part of NovaChat figures out what language you are speaking.

### 3. Speech Processing Layer

It turns what you say into text so NovaChat can understand you. This way you can have a conversation with NovaChat using your voice.

### 4. Emotion Recognition Layer

This part of NovaChat tries to understand how you are feeling. It uses computer techniques to figure out your emotions.

### 5. Intent Recognition Layer

This is the part of NovaChat that determines what you want to do or what you mean by what you say.

## 6. Response Generation Layer

It comes up with answers that make sense and tries to understand how you are feeling.

## 7. Database Layer

This is where NovaChat stores all of your conversations and your preferences. It uses something called MongoDB to do this.

## 8. Output Layer

This is the part of NovaChat that gives you the answer. You can get the answer in text or by hearing it.

The NovaChat system is set up in a way that makes it easy to add things and fix problems. This also helps NovaChat talk to you in time. The NovaChat system is very good, at talking to you and understanding what you want. The different parts of the NovaChat system all work together to make this happen.

## VIII. EXPERIMENTAL RESULTS AND DISCUSSION

NovaChat was tested to evaluate how well it performs. The results, summarized in Table 1, show that the system performs well at understanding both what people are saying

Metric	Value
Overall Accuracy	93.6%
Precision	92.8%
Recall	91.0%
F1 Score	91.9%

Table 1. Performance metrics of NovaChat

Metric	Value
Language Detection	95%
Emotion Recognition	92%
Response Generation	92.5%
Frontend Interaction	94%

Table 1. Module-wise Accuracy of NovaChat

### System Latency

Total Response Time: 472 milliseconds

The low latency shows that our system can handle real-time conversations well.

### User Evaluation

- System Usability Scale (SUS): 82.4
- Mean Opinion Score (MOS): 4.5 out of 5

These scores tell us that our system is easy to use has conversation quality and users, like it.

The results prove that NovaChat gives answers responds quickly and understands users emotions while working efficiently.

These results indicate that NovaChat performs reliably across the tested metrics, and the development team was satisfied with its overall performance.

## IX. CONCLUSION

NovaChat is a smart way to have conversations online. It can understand languages and know how people are feeling. It also responds in a way that makes sense. This is all possible because of the technology it uses.

The old way of doing chatbots had some problems. NovaChat is better because it knows how people are feeling and can talk to them in their language.

People have tried out NovaChat. It works really well. It is fast. People like using it. NovaChat understands what people want to say and how they are feeling. This makes the conversation feel more real.

This research shows that systems like NovaChat can really help people communicate online. It can be used in different areas and make things better, for people who use it. NovaChat is an example of how this can work.

## X. FUTURE SCOPE

Future changes to NovaChat may include:

- They are going to use ways to recognize emotions in NovaChat using special computer models that learn things on their own.
- NovaChat will be able to understand and talk in languages from different parts of the world.
- You will be able to use NovaChat on your phone with Android and iOS systems.
- NovaChat conversations will be managed in a way that is personalized to what the user of NovaChat likes.
- NovaChat will work with schools and hospitals and customer support systems.
- NovaChat will be able to have conversations with you using voice and the computer voice will sound more natural.
- NovaChat will have a way to keep learning and getting better at talking to people so it can have natural conversations, with the user of NovaChat.

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