

# AI Chatbot for eHealth

**Kerala Development and Innovation Strategic Council  
(K-DISC)**



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## 1 Organization Profile

Kerala Development and Innovation Strategic Council (K-DISC) is a strategic think-tank and advisory body constituted by the Government of Kerala. It aims at bringing out path-breaking strategic plans that reflect new directions in technology, product and process innovations, social shaping of technology, and creating a healthy and conducive ecosystem for fostering innovations in the State. In the sphere of development, K- DISC is promoting and initiating new projects in Emerging Technologies such as Blockchain, Internet of Things, Machine Learning, Artificial Intelligence, Robotics, and soon that would enable transparent and cognitive advances in various departments of the state Government and deliver the ultimate benefit to the citizens. K-DISC would facilitate with different government departments that may need any of these technological advances to solve their critical problems and to arrive at the proof of concepts stage with adequate technical and financial resources to promote innovation. Also, K-DISC will ease the implementation by overseeing the same

## 2 Introduction

Chatbots are software applications that use artificial intelligence & natural language processing to understand what a human wants and guide them to their desired outcome with as little work for the end user as possible.

A well designed & built chatbot will be able to:

Use already existing conversation data (if available) to **understand** the type of questions people ask.

➤ **Analyze** correct answers to those questions through a ‘training’ technique.

Natural language processing (NLP) is the backend technology used to classify the user queries into a bucket of trained chatbot conversations and identify the intention of the user by the input and appropriately respond to the user queries.

The response to the user can be in multiple formats which include but are not limited to text, buttons, hyperlinks, images, embedded videos, etc. The system will be able to continue the conversation with the user and use references from older chats to have the context of the chat. If the user question falls outside the trained conversations, then the system will be able to provide a general out of context response to the user as well as identify the question to train later in the development stage.

## 2.1 Business Case/Need for the Project

- Currently all the data under the Department of Health and Family Welfare, eHealth and other institutions are scattered in their respective websites.
- There is no mechanism to bring all the information under a single platform.
- Lack of Immediate delivery of information to the customers.
- High cost of human resource intervention.
- Lack of 24/7 support.
- Unpredictability in human interactions which may arise due to the moods and emotions of both the call center representative and the customer.

The reasons outlined above emphasize the fact that an AI chatbot system is needed to improve access to information under Department of Health and Family Welfare and eHealth.

## 2.2 International/National Scenario

Artificial Intelligence (AI) is changing our world, especially the way we interact. AI-powered chatbots have become a norm for most brands across the globe. With NLP (Natural Language Processing), **AI chatbots** have become equipped to understand the customer's intent, study its interaction history and then provide a personalized response to a query.

There is continuous advancement focused on making chatbots more multilingual, training them to understand cultural nuances and colloquialisms with the sole intention of making conversations with them as human-like as possible.

Today, companies use AI chatbots for lead generation, engagement, customer support, in-store experience replication, personalized recommendations, selling, and much more. And chatbots are predicted to save businesses \$8billion by 2023.

The adoption of chatbots was accelerated in 2016 when Facebook opened its developer platform and showed the world what is possible with chatbots through their Messenger app. Google also got in the game soon after with Google Assistant. Since then, there have been a tremendous amount of chatbot apps built on websites, in applications, on social media, for customer support, and countless other examples.

ChatGPT has opened a new window to the world of AI, and specifically to AI chatbots, with immense possibilities.

## 2.3 Summary of the Proposal

eHealth portal(<https://ehealth.kerala.gov.in/>) has total visitors of 1075459 as of April 12, 2022, 90% of the traffic comes from India, with an average time spent on site is just above 5 minutes and most of the people going out of the site visits [www.google.com](http://www.google.com) as their next site, most probable explanation of which is, the answer the user was looking for was not found on the portal. The importance of improving the experience of the user that comes into the portal can be seen evident here. [SOURCE: [HTTPS://WWW.ALEXA.COM/SITEINFO/KERALA.GOV.IN](https://www.alexa.com/siteinfo/kerala.gov.in)]

A chatbot that is backed by artificial intelligence is a conversation-driven system that is used to converse with the user and give an appropriate response to the user's query. This system is proven to improve the user experience while interacting with a website.

The use of a chatbot will

- Improve user interactivity by collaborating all the portal data into one place and giving responses to user queries in a conversational manner.
- Reduce the response time to the user with around-the-clock availability and answer simple queries with ease.
- provide a personalized experience to the user.

Hence using a chatbot will improve the overall user experience with eHealth portal and possibility of higher usage of the portal.

## 3 Project Objectives

A single access point for disseminating all information in the eHealth portal using a Multilingual (English and Malayalam) AI chatbot with voice communication capabilities. Following are the functionalities provided through AI chatbot.

- 1) Online appointment booking for UHID registered users and new patient registration through API integration with eHealth system.
- 2) To provide information of all government hospitals with available health facility information from eHealth portal through eHealth API.
- 3) Provide general information given by Health Department on Cancer Screening, Communicable Diseases, Non-Communicable Disease & Ammayum Kunjum (അമ്മയുടെ കുഞ്ഞു) displayed on appropriate selection.
- 4) To provide first level online screening for cancer and non-communicable disease, based on Questionnaire given by Health Department.
- 5) To provide screening status for patients tested at the FHCs using API integration with eHealth.

## 4 Scope of the Project

- To develop an AI chatbot for the eHealth portal. The chatbot should be a plugin that can be integrated into the eHealth portal. The chatbot should provide the following services:
  - 1) Interactive Online Appointment Process - It helps the citizens/patients to book online appointments to any of the Government Hospitals with ease in choosing their preferred time and date, also providing the doctors prior information of these appointments, avoiding unnecessary chaos. Online appointment is provided interactively through the existing online appointment API of eHealth portal.
  - 2) Interactive UHID Registration Process – UHID is the unique Health ID created using Aadhaar Based registration. After the UHID registration, he/she can use the card for lifelong at Government Hospitals for getting treatment. Online UHID registration is provided interactively through the existing online UHID registration API of eHealth portal.
  - 3) Information of all Govt Hospitals – Provides the available health facilities at the eHealth integrated hospitals and locations, contact numbers and addresses of other government hospitals.
  - 4) Cancer Screening & Non-Communicable Diseases Screening- General information for both cancer and NCD screening will be shown on appropriate selection. The status of the screened patients will be displayed on selection, as available in the eHealth data, received through API. Interactive Cancer screening and NCD screening online assessments are also available for individuals who are willing to participate. (Attached as [ANNEXURE -I](#))
  - 5) Communicable disease - General Information for the communicable disease will be provided.
  - 6) Ammayum Kunjum (അമ്മയുടെ കുഞ്ഞിനെ) – General information like Due Date Calculation (LMP Calculation) Process, Vaccination Schedule Information, Delivery Services Information, Scheme (Govt) Information, Antenatal Care Frequency Information, Antenatal Advices, Lactation Advices, Nutritional Advices, Neonatal Care Advices for mother and Immunization Schedule Information, Child Scheme Information, District Early Intervention Center (DEIC) Locations, Nutritional Advices, Anganwadi Services (Locations) for child will be provided.
  - 7) For testing and VAPT, till the integration is completed with the eHealth platform, Chatbot should work as a standalone application. The chatbot shall be integrated with eHealth platform after successful testing and VAPT.

## 4.1 Functional Requirements

### 4.1.1 Online appointment booking facility for eHealth registered users (through eHealth API)

- eHealth has an online booking facility for patients to the Government hospitals. The AI chatbot will provide an interface for online appointment booking by using API from eHealth

### 4.1.2 Information of all Government Hospitals

- The chatbot application shall provide users with the details of facilities available at ~1400 Government Hospitals. The details of available facilities shall be provided by eHealth.

### 4.1.3 Cancer screening Status

There will be three options provided by the chatbot for the user to choose from, regarding Cancer Screening.

1. General Information
2. Self-Assessment Questionnaire
3. Cancer Screening Status

**General Information** will provide the user with generic information related to Cancer. The documents to be used to display to the users will be provided in word/excel format, by eHealth.

**Self-Assessment Questionnaire** - A Questionnaire to assess the risk of the user (to be provided by the eHealth Department) is presented to the user in a conversational manner. Based on the assessment on the response to the questionnaire, Chatbot will direct if the person needs to go to the nearest Primary Health Center.

**Cancer Screening Status** - The following steps will follow when the user tries to check the status of screening that they did at the PHC.

- Step 1 : User will provide their UHID / Mobile Number
- Step 2 : Using the User input in step 1 an OTP Verification is done to the registered mobile number (Subject to OTP verification provided by eHealth API).  
Appropriate message will be displayed on non-verification of Aadhaar.
- Step 3 : DOB of the user is validated (if the user doesn't have UHID/Mobile Number)
- Step 4 : If the Cancer screening status is available in eHealth server then the status will be shown
- Step 5 : If there is no screening status available for the user in eHealth server, then that message is conveyed to the user.

### 4.1.4 NCD screening Status

There will be three options provided by the chatbot for the user to choose from, regarding NCD Screening.

1. General Information
2. Self-Assessment Questionnaire
3. NCD Screening Status

**General Information** will provide the user with generic information related to non-Communicable diseases. The documents to be used to display to the users will be provided in word/excel format, by eHealth.

**Self-Assessment Questionnaire** - A Questionnaire to assess the risk of the user (to be provided by the eHealth Department) is presented to the user in a conversational manner. Based on the assessment on the response to the questionnaire, Chatbot will direct if the person needs to go to the nearest Primary Health Center.

**NCD Screening Status** - The following steps will follow when the user tries to check the status of screening that they did at the PHC.

- Step 1 : User will provide their UHID / Mobile Number
- Step 2 : Using the User input in step 1 an OTP Verification is done to the registered mobile number (Subject to OTP verification provided by eHealth API).  
Appropriate message will be displayed on non-verification of Aadhaar.
- Step 3 : DOB of the user is validated (if the user doesn't have UHID/Mobile Number)
- Step 4 : If the NCD screening status is available then the status will be shown
- Step 5 : If there is no screening status available for the user in server, then that message is conveyed to the user.

#### 4.1.5 UHID Registration Process (New patient registration – through eHealth API)

- Step 1 : User will provide their Aadhaar Number
- Step 2 : Using the User input in step 1 an OTP Verification is done to the registered mobile number (OTP verification provided by eHealth API).  
Appropriate message will be displayed on non-verification of Aadhaar.
- Step 3 : User personal information will be displayed (Name, Age, Address & District)
- Step 4 : User will provide their Mobile Number.
- Step 5 : The user is then registered in eHealth application, and a confirmation message is sent to the registered mobile number.

The UHID is generated for the new patient by eHealth application and patient details are updated in eHealth database through API.

#### 4.1.6 Sample Web User Interface (Web UI)



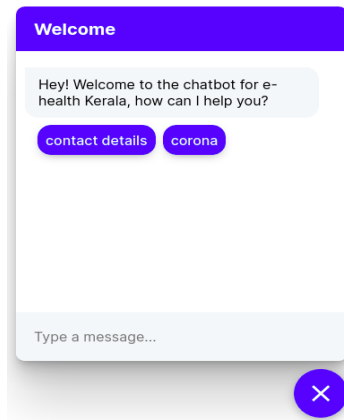


Figure 1: UI component

- a. Web interface supports different response formats which include text, buttons, images, hyperlinks, embedded video, or combinations of the above-mentioned.

Web User interface which can be customized to match the color palette of the portal and support different types of response.

- b. Multiple responses support for particular user input

Chatbot can understand the intention of the user using state of the art machine learning and deep learning and respond to the user with multiple forms of output which include text, image, hyperlink, etc.

- c. Customizable welcome message

Welcome messages can be customized to reflect the portal theme.

- d. Custom buttons along with the welcome message

Give an idea about the possibilities of the chatbot.

- e. Multi-language support [Malayalam support]

Chatbot also supports the Malayalam language for regional users.

#### 4.1.7 Natural Language Processing Model

- a. Best in class for natural language understanding

- b. Context memory to make the chat more conversational.

Chatbot will keep the user input in memory and will not ask the user further in the conversation which will improve user experience.

- c. Two-way voice-enabled [important]

AI chatbot can take voice as input and response to the system can also be converted to voice for improving the user experience and availability of AI chatbot to differently abled people as well.

d. Knowledge based integrated response.

#### 4.1.8 External integration

a. API integration with eHealth

AI chatbot can be integrated through API with eHealth for the following functionalities.

1. Online Appointments
2. New Patient Registration
3. Cancer Screening Status
4. NCD Screening Status

b. UIDAI server integration

For Aadhaar Authentication, UIDAI server integration may be required.

## 4.2 Non-functional Requirements

a. 24/7 availability

As compared to the human counterpart, the chatbot will be available round the clock to help with the user queries.

b. Reduced responsive time compared to human response.

The AI chatbot reduces the time taken to answer user queries, which improves the user experience.

c. Data Security

The entire AI chatbot system works on-premises, which will ensure the security of the data handled by the system.

## 5 Implementation Strategy

### 5.1 Technical Approach

### 5.2 Deliverables/Milestones

Sl.No:	Deliverables	Duration	Format
1	AI Chatbot First Version		
2	Final version after incorporating all feedbacks and bug fixes		

3	Final Deployment at State Data Centre and Security Audit Clearance		
4	APIs for eHealth and support for integration with eHealth		
5	UAT with Department and Incorporation of UAT feedback from Department		
6	Production Release URL and APIs for eHealth		
7	Source Code and other Artifacts		
8	Project Completion Report		

### 5.3 Key Benefits to be achieved

- 24/7 availability.
- Better utilization of manpower and cost savings.
- Better user experience for the visitor since the chatbot reduce wait times and streamline conversations, minimizing the potential for customers' stress and annoyance.
- Conversational response lends to user happiness.
- Reduced responsive time compared to human counterparts
- Improve the redirection of customer queries.
- Keeps extensive records of the conversation which can be used for analysis and further improvement in chatbot.

### 5.4 Project Schedule

*(To be filled by Start-up)*

### 5.5 Responsibilities of Department

*(To be filled by Start-up)*

T

## 6 Hardware Specifications

*(To be filled by Start-up)*

## 7 Financials

### 7.1 Cost Estimate Summary

SI No	Particular	Quantity	Unit	Unit Rate (Rs.)	TOTAL COST (Rs.)
<b>1</b>	<b>Hardware (VMs shall be provided by K-DISC)</b>				
1.1					
1.2					
<b>2</b>	<b>Software</b>				
2.1					
2.2					
<b>3</b>	<b>Manpower</b>				
3.1					
3.2					
<b>4</b>	<b>Miscellaneous</b>				
4.1	Travel				
4.2	Accommodation				
4.3	Contingencies				
<b>5</b>	<b>TOTAL COST (without GST)</b>				
<b>6</b>	<b>GST</b>				
<b>7</b>	<b>TOTAL COST (with GST)</b>				
<b>8</b>	<b>Warranty (For One year after Pilot implementation)</b>				
<b>9</b>	<b>AMC (without GST)</b>				
<b>10</b>	<b>GST</b>				
<b>11</b>	<b>TOTAL AMC COST (with GST)</b>				

### 7.2 Payment Terms

*(To be filled by Start-up)*



## 8 ANNEXURE -1

### Risk Info

- താങ്കളുടെ വയസ്സ് എത്ര?(No need to show the Question autocalculate the score based on age. (Auto calculated)

Values:	score
30-39	0
40-49	1
>=50	2

- നിങ്ങൾ പുകവലിക്കുന്ന / പുകവലിച്ചിരുന്ന ആൾ ആണോ?
  - Yes
  - No(0)
  - If Yes selected then ask following questions.
  - എത്രമാത്രം വയസ്സിൽ താങ്കൾ പുകവലി തുടങ്ങി?
    - ✓ Provide text box for entering age (min value= 9 max =100)
    - ✓ ഉചിതമായത് തിരഞ്ഞെടുക്കുക
      - ദിവസവും പുകവലിക്കുന്നു(2)
      - വല്ലപ്പോഴും പുകവലിക്കുന്നു(1)
      - നിർത്തിയിട്ടു ഒരു വർഷത്തിൽ താഴെ ആയി.(1)
      - നിർത്തിയിട്ടു ഒരു വർഷത്തിൽ കൂടുതൽ ആയി(1)
- താങ്കൾ പാൻ പരാഗ്,മുറുക്കാൻ എന്നീ പുകയില ഉത്പന്നങ്ങൾ ഉപയോഗിക്കാറുണ്ടോ ?
  - Yes
  - No(0)

#### If Yes then

- ✓ Tobacco Status:
  - ദിവസവും(2)
  - പണ്ട് ഉപയോഗിച്ചിട്ടുണ്ട്(1)
  - വല്ലപ്പോഴും ഉപയോഗിക്കാറുണ്ട്(1)
- താങ്കൾ മദ്യപിക്കുന്ന ആൾ ആണോ?
  - അതെ(1) അല്ല(0)
  - If yes selected then enable the next question.  
കഴിഞ്ഞ ഒരു വർഷത്തിനിടയിൽ സാധാരണയായി താങ്കൾ എത്ര പ്രാവശ്യം മദ്യപിച്ചു?

✓ Following are the answers for above question.

- ഇല്ല
- മാസത്തിൽ ഒരു തവണയോ കുറവോ.
- മാസത്തിൽ രണ്ടു മുതൽ നാലു തവണ
- ആഴ്ചയിൽ രണ്ടോ മൂന്നോ തവണ
- ആഴ്ചയിൽ നാലോ അതിൽ കൂടുതൽ തവണ

➤ **ഇടുപ്പ് ചുറ്റളവ് (in cm)**

Female values	Male values	Score
<=80 cm	<=90 cm	0
81-90 cm	91-100 cm	1
>90 cm	>100cm	2

➤ താങ്കൾ ആഴ്ചയിൽ 2.30 മണിക്കൂറുകൊണ്ടും ഏതെങ്കിലും തരത്തിലുള്ള ശാരീരിക അധ്വാനത്തിൽ ഏർപ്പെടാറുണ്ടോ ?

- Yes(1)
- No(0)

➤ താങ്കളുടെ കുടുംബത്തിലാർക്കെങ്കിലും (അച്ഛൻ,അമ്മ,സഹോദരങ്ങൾ ) രക്താതിമർദ്ദമോ ,പ്രമേഹമോ , ഹൃദ്രോഗമോ ഉണ്ടോ ?

- Yes(2)
- No(0)

**Detection**

**For male**

- വായ തുറക്കാൻ ബുദ്ധിമുട്ടുണ്ടോ  
Yes            No
- രണ്ടാഴ്ചയിൽ കുടുതലായി ഉണങ്ങാത്ത വായക്കുള്ളിലെ മുറിവ്  
Yes            No
- മൂന്ന് ആഴ്ചയിൽ കുടുതൽ ഉള്ള ശബ്ദത്തിലെ വ്യത്യാസം  
Yes            No

**For Female**

- തുടർച്ചയായി ശ്വസിക്കാനുള്ള ബുദ്ധിമുട്ട്  
Yes No
- രണ്ടാഴ്ചയിൽ കൂടുതലുള്ള ചുമ  
Yes No
- കഫത്തിൽ രക്താംശം  
Yes No
- വായ തുറക്കാൻ ബുദ്ധിമുട്ടുണ്ടോ  
Yes No
- രണ്ടാഴ്ചയിൽ കൂടുതലായി ഉണങ്ങാത്ത വായക്കുള്ളിലെ മുറിവ്  
Yes No
- മൂന്ന് ആഴ്ചയിൽ കൂടുതൽ ഉള്ള ശബ്ദത്തിലെ വ്യത്യാസം  
Yes No
- സ്തനത്തിലെ മുഴ / തടിപ്പ്  
Yes No
- മുലക്കണ്ണിൽ നിന്ന് വരുന്ന രക്തമോ മറ്റു സ്രവങ്ങളോ  
Yes No
- സ്തനങ്ങളുടെ ആകൃതിയിലോ വലിപ്പത്തിലോ ഉള്ള വ്യത്യാസം  
Yes No
- കുട്ടികളുണ്ടോ (If age >40)  
Yes No
- രക്തബന്ധത്തിൽ ആർക്കെങ്കിലും സ്തനാർബുദം സ്ഥിരീകരിച്ചിട്ടുണ്ടോ  
Yes No
- മാസമുറക്കിടയിലുള്ള രക്തസ്രാവം  
Yes No
- മാസമുറ നിന്നതിനു ശേഷമുള്ള രക്തസ്രാവം  
Yes No
- ശാരീരിക ബന്ധത്തിന് ശേഷമുള്ള രക്തസ്രാവം  
Yes No
- ചീഞ്ഞ ഗന്ധമുള്ള യോനീസ്രവം  
Yes No



**GROUPING cancer questions**

**Oral Cancer**

- 1)Difficulty in opening mouth
- 2)Ulcers/ patch/ growth in the mouth that has not healed in two weeks
- 3)Any change in the tone of your voice

**Breast Cancer**

- 1)Lump in the breast
- 2)Blood stained discharge from the nipple
- 3)Change in shape and size of breast
- 4) Do you have children?
- 5) In blood relations,Has anyone been diagnosed with breast cancer?

**Cervical cancer**

- 1)Bleeding between periods
- 2)Bleeding after menopause
- 3)Bleeding after intercourse
- 4)Foul -smelling vaginal discharge