KARNATAKA STATE COUNCIL FOR SCIENCE AND TECHNOLOGY
Indian Institute of Science campus, Bengaluru
Telephone: 080 -23600978, 23341652 || Email: spp@kscst.org.in
Website: www.kscst.iisc.ernet.in/spp.html or www.kscst.org.in/spp.html

FORMAT FOR STUDENT PROJECT PROPOSAL FOR THE

46th SERIES OF STUDENT PROJECT PROGRAMME

(Handwritten proposals will not be accepted, please fill all the details in this MS word file, insert images / diagrams wherever necessary. Convert to pdf file, get it approved from the project guide/head of the department and principal of your institution. Keep ready the scanned pdf file of 1) Declaration and Endorsement 2) details of processing fees made and fill-up the Google Form. Send the softcopy of the project proposal including the three scanned pages and send the proposal (All information in one pdf file) by email to spp@kscst.org.in

https://forms.gle/pMfzw4iKL7LNAojd8

1.	**Name of the College: REVA University**
2.	**Project Title: Design and Development of AI based Interactive Robot as a Companion for Elderly Care.**
3.	**Branch: Electronics and Computer Engineering**
4.	**Theme (as per KSCST poster):** **(The project proposals shall mandatorily be from one of the broad themes/areas. Visit website www.kscst.org.in/spp.html)** 5. User-friendly devices for aged or physically challenged people 6. Robotics / 3D printing / Cyber security
5.	**Name(s) of project guide(s):** **1. Name: Prof. Md. Tauseef** **Email id: md.tauseef@reva.edu.in** **Contact No.: +91 8618071351**
6.	**Name of Team Members (Strictly not more than four students in a batch):** *(Type names in Capital Letters as provided in your college)* (Please paste the latest passport size photograph adjacent to your respective names) **Name: MAHAMMAD SHAFIN VOHRA** **USN No.: R19LC020** **Email id: mohammedshafin055@gmail.com** **Mobile No: +91 7487812395** 

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7.	**Team Leader of the Project:** **Name: MAHAMMAD SHAFIN VOHRA** **USN No.: R19LC020** **Email id: mohammedshafin055@gmail.com** **Mobile No.: +91 7487812395**
8.	**Processing Fee Details (Through Online Payment only):** **(processing fee of Rs. 1000/-)** **Please furnish the payment made details provided in the last page of this proposal.** **Note:** (The student team shall furnish the details in the Google Form. It is informed to the students to 1) keep ready the project proposal and 2) make the payment made details for processing fees and 3) Enter the details in the Google Form on the same day of payment made to KSCST by NEFT / UPI payment).
9.	**Date of commencement of the Project:** November 2022
10.	**Probable date of completion of the project:** May 2023
11.	**Scope / Objectives of the project:** 1. To remove loneliness among golden-ager persons. 2. To monitor the activities of elderly person. 3. To contact support in case of emergencies.

12. **Methodology:**

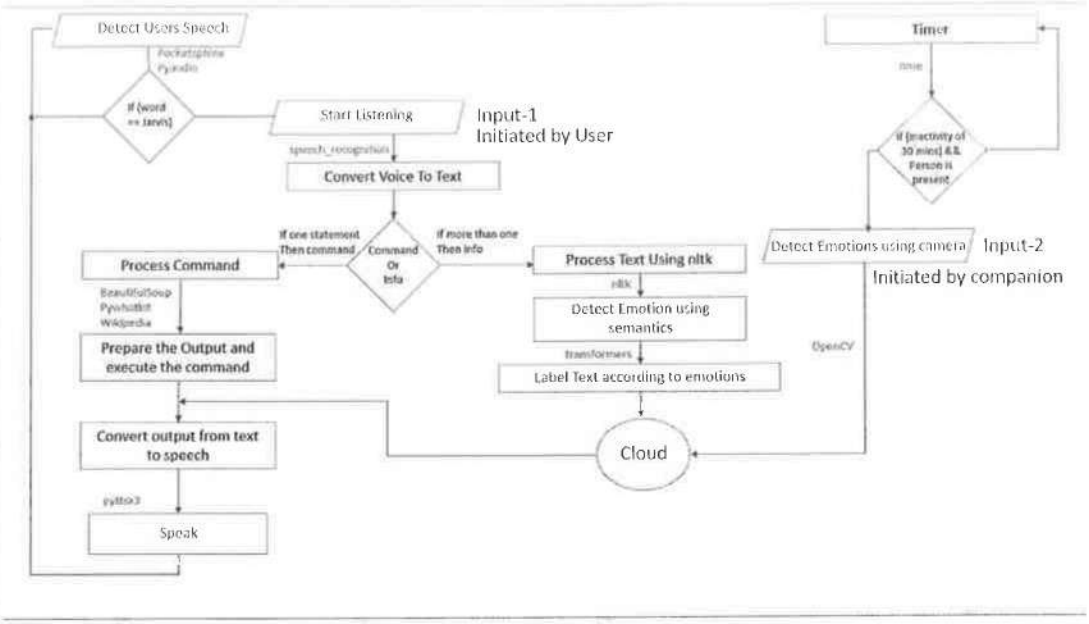

Fig: 1

The project "Design and Development of AI-based Interactive Robot as a Companion for Elderly Care" is about a device which will be used as a companion or a friend by many people who have reached to a grey period of old age. To implement this project, we are making use of raspberry pi version 4B along with a pi camera, microphone, speaker and an interface.

The above figure displays the flow chart which shows the data flow that happens internally.

The device is being designed and developed for implementing two-way communication. Now to do so we have two sources of input. These are one through which the user can initiate the conversation and the other through which the device will initiate the conversation.

The first source of input is the microphone through which the first step will be to detect users' speech and check if the user has uttered the keyword or not. Once the keyword has been uttered, the device will start listening to the voice. When the user has finished speaking, the user's voice will then be converted into text format for further processing.

At this point, we have the input given by the user in text format. Here, we have the task of determining if the input is a direct command from the user. Or it is simply some friendly information that can be collected by the device to make it more personalized and more friendly. To do that, we will check if the input provided consists of only one statement or if it consists of multiple statements. If it consists of a single statement then it will be

considered a command, and if it consists of multiple statements then it will be considered valuable information.

Once the recognition is completed, we will have two different routes for command and information respectively. If the input provided by the user is recognized as a command, it will be processed using different machine learning and web scraping modules of Python. When the command is processed the device will execute the command using the required module and prepare an output to be given to the user. The last step here will be to convert that output from text format to speech and convey it to the user through the speakers. After conveying the message, it will again go back to recording the voice and detecting the keyword.

Coming back to the recognition of input we have our second route for handling the information that we get from the user. If the input provided is recognized as information, then the data will be processed, and the emotions of the person will be detected using the semantic module in Python. Based on the emotions of the person, data will be labelled, processed, and stored for future use and training machine learning models. After processing the information provided, related information will be fetched from the data according to the emotions and it will be converted from text format to voice format for conveying it to the user.

The second source of input is the camera. In case of inactivity for a long period, i.e., the timer expires, the device will prompt the user to initiate the conversation. The camera will determine whether the user is present in the frame or not. If the user is not present then it will wait for the user to come back, and if the user is present then it will recognize the emotions of the person using the deep face module of Python. After detecting the emotions, related data will be fetched from the cloud, and it will be processed for conveying it to the user.

Note: In case of fabrication work in the project, an engineering drawing with dimensions / detailed design should be attached to the proposal.

13.	**Expected Outcome of the project:** The AI & IoT-based solution is implemented on a Raspberry Pi 4B with several other peripherals, such as picamera, a microphone, a speaker, and an interface. This device is developed in order to reduce loneliness and social isolation in older adults. The device should be capable of initiating the conversion by itself if it detects inactivity for a long period of time. It will also notify the person's close relatives in the event of an emergency. The device will act as a friend, listening to the user, and storing the data provided by him or her, which can be used to create machine learning models in order to make the device more user-friendly. It will also perform basic tasks such as setting the alarm, making reminders for the day, knowing the weather forecast, playing a song from the playlist, finding out the meaning of an unknown word, reading an article from Wikipedia, and controlling electronic devices.
14.	**Is the project proposed relevant to the Industry / Society or Institution?** **Yes / No: Yes** **If Yes, please provide details of the Industry / institution and contact details:** Yes, the project is revenant to Industry/ Society but we haven't approached to any industry or any organization for support/funds. (**Note:** Preference will be given to those projects relevant to the industry / institution. Hence be specific in giving detailed information). Is the industry extending support - technology / funds / use the final product, please specify.
15.	**Can the product or process developed in the project be taken up for filing a Patent?** **Yes / No: Yes** **Prior Art search done?** **Yes/No: No** **Note:** If your answer is "Yes", you may contact Patent Information Centre of KSCST. For more details, email: pic@kscst.org.in

16. Budget details (break-up details should be given):

Note: KSCST will provide nominal grant support for carrying out the project by students if selected by the project selection committee.

Budget	Amount
a) Materials / Consumables (Please specify) • PIMORONI Pirate Audio Speaker for Raspberry Pi • Raspberry Pi USB2.0 Mini Microphone • Raspberry Pi Camera Module V2-8 Megapixel,1080p (RPI-CAM-V2) • Raspberry Pi 4 VIA Model B 4Gb • 3.5in LCD Display for Raspberry Pi • Raspberry Pi 15W adapter	18,880
b) Labor (Describe)	0.00
c) Travel (Describe)	0.00
e) Miscellaneous (Please specify) • Out Casing (3D print/Acrylic Sheet)	2,000
Total	20,880

17. Any other technical details (Please specify):

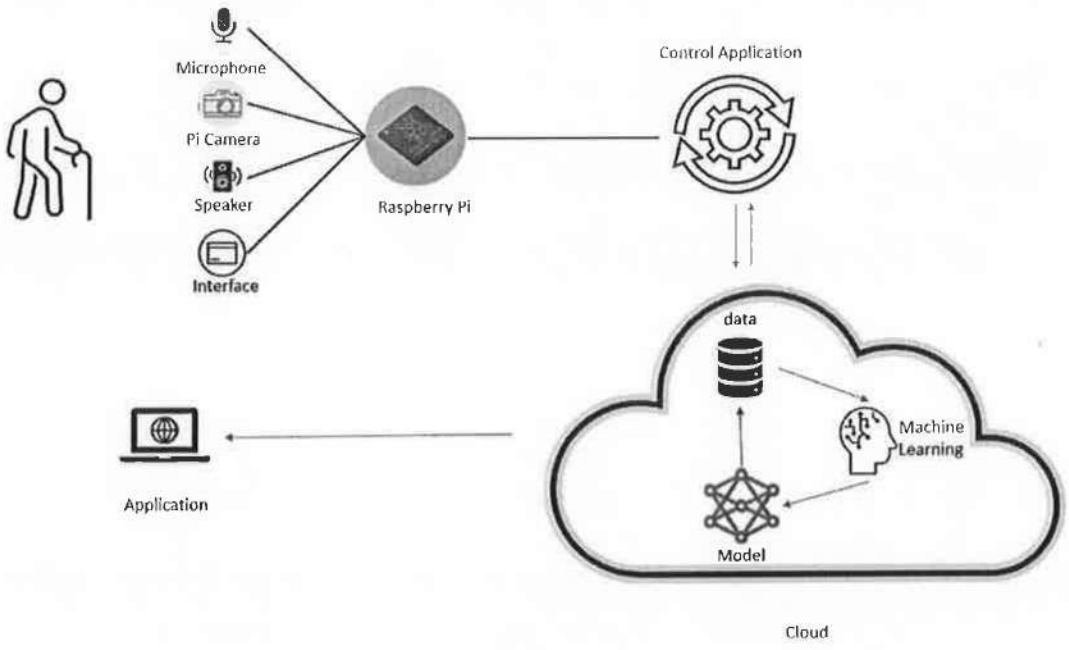

Fig:2

As shown in figure 2 the whole system can be broken down into nine parts.

1. User: The input will be in voice format and stored as an audio file. The same audio file will be then converted into text format to process the command.
2. Microphone: This endpoint of the system will be acting as input one. The user will have to utter a key word for waking up the device. Once the keyword is detected, system will start taking in the input. For both the functionalities microphone is the key element.
3. Camera: This endpoint of the system will be acting as input two. Camera will be recognizing the face of the person and base on the emotions of the person it will fetch data from cloud and process accordingly. The Raspberry Picamera module originated at Raspberry Pi foundation. It is an 8MP fixed focus camera. This is the plug-and-play-compatible latest version of the Raspbian operating system, making it perfect for recording video, motion detection and security applications.
4. Speaker: This endpoint of the system will be used to convey the output to the user.
5. Interface: It presents information in a manner that is clear and concise regarding the state of the device and user.
6. Raspberry Pi 4B: Raspberry Pi is a small single board computer which plays the most important role in the device. The Raspberry Pi 4 Model B comes with a 1.5 GHz 64-bit quad core ARM Cortex-A72 processor, on-board 802.11ac Wi-Fi, Bluetooth 5, full gigabit Ethernet two USB 2.0 ports, two USB 3.0 ports, 1–8 GB of RAM, and dual-monitor support via a pair of micro-HDMI ports for up to 4K resolution. The Pi 4B is powered via a USB-C port, enabling additional power to be provided to downstream peripherals, But the Pi can only be operated with 5 volts.
7. Control application: The program logic which will be written, and the raspberry pi will be programmed using the same logic for controlling the data flow.
8. Cloud: All the data will be stored and processed in the cloud, data will be fed to machine learning algorithms in order to create models for further assistant.
9. Application: An application will be developed for the reference of other people to monitor or get informed in case of emergencies.
10. Python: Python is a high-level, general-purpose programming language. Python is dynamically typed, and garbage collected. It supports multiple programming paradigms, including structured, object-oriented and functional programming. Python include large standard library that provides tools suited to many tasks. It includes modules for creating graphical user interfaces, connecting to relational databases,

	generating pseudorandom numbers, arithmetic with arbitrary-precision decimals, manipulating regular expressions, and unit testing.
18.	**SPP Coordinator (Identified by the college):** **Note:** To be identified by the principal of the institution. The project proposals must be submitted to KSCST through SPP coordinator designated by the Principal. **Name: Prof.** Praveen Math, Assistant Professor, School of Mechanical Engineering, REVA University **Email id:** praveenmath@reva.edu.in **Contact No.:** 9632408454

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