Technical Reports
For
Robotics Software Engineering

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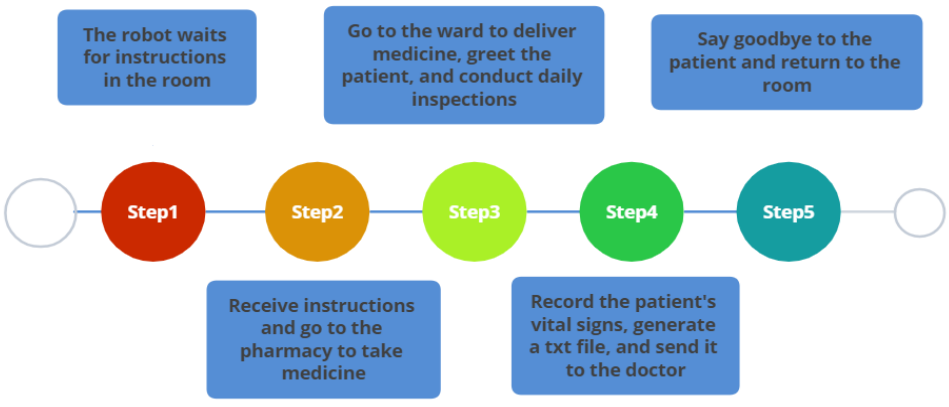
The overview of the whole project

Introduction:

We have established an intelligent robotic nurse system to replace the nurse's functions to a certain extent, and remotely assist the doctor to complete the work of helping patients take medicines and carry out daily inspections. With the help of this system, the doctor can remotely command the robot to go to the pharmacy to send the medicine to the patient through the WeChat, and remotely obtain key information such as the patient's signs through the dialogue between the robot and the patient, and judge the subsequent treatment plan based on the information.

The frame of the whole project:



Used technology:

- Navigation function provided by turtlebot_navigation
- Online voice recognition provided by XunFei
- Expression recognition function provided by Baidu AI
- WeChat remote communication function provided by itchat

The Speech Part

Introduction:

We implemented the speech part based on the speech recognition module provided by xfei_asr and sound function provided by sound_play. I wrote a python script that declare a subscriber and a c++ source file that declare a publisher to implement this function. The topic subscription relationship is shown in the figure below (Figure 1). The robot can determine the way to greet the patient based on the results of the expression recognition. In addition, it can also assist in the daily inspection work, such as asking the patient's body temperature, blood pressure and other signs, to generate a txt document, which will be transmitted to the doctor through WeChat to help him make a judgment.

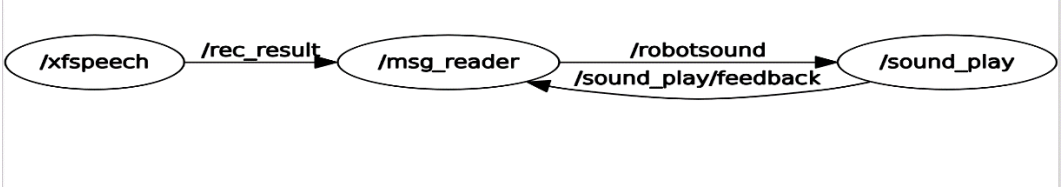
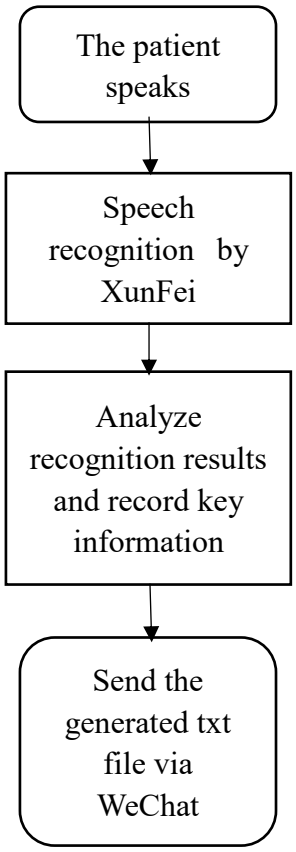


Figure 1

The frame of this part:



Technical details:

We mainly use the voice recognition function provided by XunFei. XunFei provides a program interface for speech recognition, which can realize online speech recognition by converting the heard sound into text in real time. In our project, I wrote the my_publish.cpp file based on the iat_publish_speak.cpp file for speech-to-text provided in xfei_asr, which declares a publisher that can convert the sound it hears into text every 15 seconds and publish it to the /rec_result topic as a String.

Then I wrote the msg_reader.py file to declare a subscriber which can

receive the String mentioned above and make an analysis to record the key information in a txt file. For example, when the message contains keywords such as 37, 38, it will be judged as body temperature information and recorded in the column of body temperature. When the daily inquiry is over, a txt document like the one shown below will be generated, recording the patient's signs. All the work will start when the robot arrives at the ward.

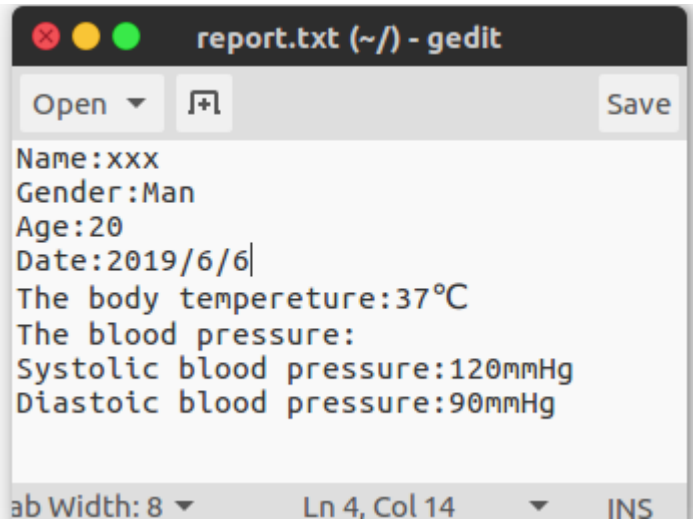


Figure 2

This txt document will be sent to the doctor remotely via WeChat at the end using the features provided by itchat.

Related topics:

/dialog: Subscribe to this topic and receive a message when the robot arrives at the ward, causing the node /msg_reader to begin receiving the speech-recognition result provided by XunFei.

/rec_result: Passing the content of the recognized speech between the node /xfspeech and msg_reader

/finished: At the end of this part, publish a message to this topic, let the navigation section start navigating back to the original room of the robot.

Dependences:

xfei_asr package

rosrun sound_play sound_play_node.py before