

An Investigation of Telegram Technique for Remote Communicating of Human Support Robot Application

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Abstract: Nowadays, scientific researches in robotics have become more common to the world. The purpose of making robots are to make a person's life better by solving humans' problems and replace human to work in hazardous place. Thus, this project is composed of the development of communicating system with Telegram Bot through a robotic research platform Human Support Robot (HSR) provided by Toyota. In general, the basic design of this project focused on the communication between customers and robot through the Telegram Bot. The idea of this project is to solve the communication problem such as noise, distance and etc. All of these processes are handled by Telegram core and NLP package. The packages will transfer the data to each other's with ROS topic. When the chat has ended, they will send the recorded information obtained from the chat to the main core package as result. This ensure that client will not lose connection with the robot and ensure the environment factor will not affect the robot understanding process.

Keywords: Telegram Bot, Remote Communication, HSR, ROS

1. Introduction

Researches in robotic field comprises of two components, software and hardware. The development of the hardware part of robotics is seen to be well innovated and getting more practical towards its functionality. However, it is more challenging to improve the software development especially in the dynamic and real environment which is closer to human. This paper explained the development of software on HSR which is built by Toyota. HSR featured one arm with a gripper, head with two stereo cameras, one RGBD sensor and base with one LIDAR sensor. The software part of HSR include speech to text, text to speech, object detection, human recognition, mapping, navigation, manipulation, NLP and etc. HSR works with ROS (Robot Operating System). ROS is meta operation system which is install on ubuntu with various distributions such as ROS Kinetic that is used in this project. The main idea of ROS is to make communication between packages easier and reduce errors. ROS use publisher and subscriber to send data through message as shown in the Figure 2.

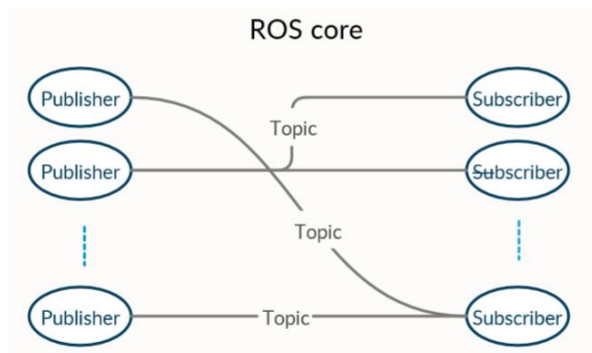


Figure 2: ROS publishers and subscribers.

ROS support a number of languages such as Python, C++, MATLAB, Lisp and etc. One of the main communication interfaces between the robot and users is speech to text synthesis. The efficiency of information delivered through this method depends on some variables such environment's noise, accent, pronunciation, volume of input sound and most importantly distance between the two communicators. For long-distance applications, user might lose connection with the robot where its status and vision are unknown. Thus, this project creates a HSR's Telegram Bot as a communication interface between the robot and user to exchange data and instructions using Telegram application. These communications process is handled by NLP. NLP stand for natural language processing. NLP chose the best answer to reply the user and try to relate information in the message and chat like a real person.

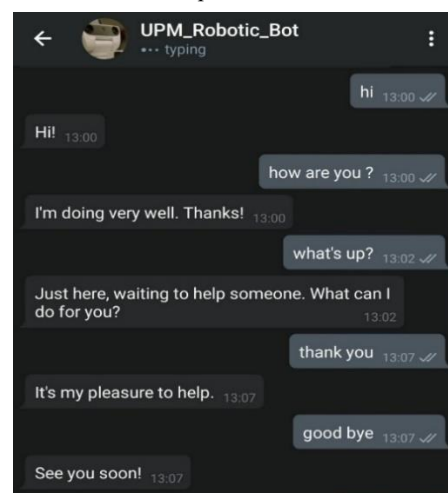


Figure 3: Example of NLP

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Figure 3 shows the NLP core perform conversation for appointment purposes. The robot will do the task using the information obtained and in the given duration. Moreover, the robot will continue to ask question from the client if the information received is not enough.

2. Methodology

The owned robot can operate variety of packages. However, for this paper, we will be discussing focusing on core package which are NLP and the Telegram core package. For starters, the Telegram core package has four topics. Two of the topics are publisher while another two them are subscriber. Furthermore, the subscribers are MessageFromROS and ImageFromROS while the publishers are MessageToROS and ImageToROS.

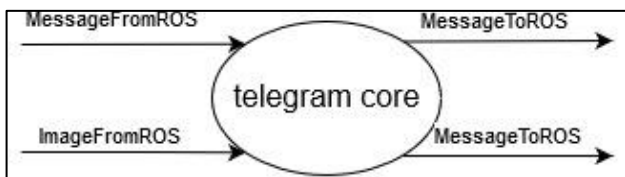


Figure 4: The Telegram Core Package

When the Telegram core receives the message from client, it will be published for others packages. It also subscribes the message from others package and send it to the client. Other than that, Telegram core also includes authenticate step. In this step, the Telegram core will identify the id of the client. if admin is recognized, the admin will be connected to the robot. Then, the client can start to send messages communicate with the robot. The other package is the NLP core. This package will subscribe the client message from their Telegram core which will then be replied with related answer.

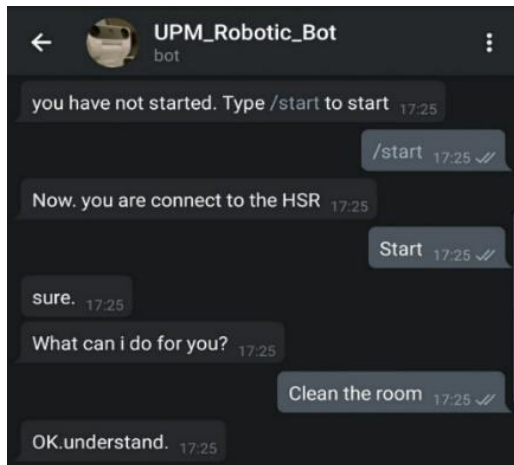


Figure 5: Human Robot Interface Using Telegram Bot

As for the last package is the main core. The main core has several topics which are objects, speech result and MessageToROS. It is because the main core controls all the packages and communicate with them. NLP core has several if else and detect part of the sentence such as verb and subject. When the text receives from the Telegram NLP core which at the first will splits the part. Then it will look for action. The robot should take other necessary information and if NLP core find some of the information that are

missing, it will ask use for more information. After that, the information sends the standard command to the main core. Next, the robot will start to do the task. The main core and Telegram core can send messages and read messages directly. As for example, the client can see the objects or view of robot and other topics.

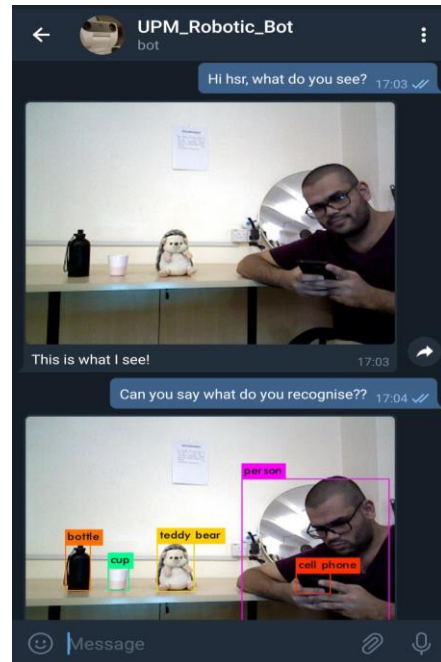


Figure 6: The Achieved Result Obtained From The Robot

As you see in figure 6, NLP core look for a keyword on the sentence. If the robot cannot find the keyword, it will ask the client to tell more information.

3. Concluding Remarks

Nowadays human tend to use smart phone to manage their daily life activities such as online shopping or internet banking in the online platform. So it's applies the same to home robots, which is by accessing and controlling the robot from anywhere or from home. In future we hope to replace the NLP core with Dialogflow from google and subscribe the result from Dialogflow API.

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