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SCIENTIFIC PROJECT REPORT

Implementation of Mycroft ai on Raspberry pi to recognize what3words

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1 Abstract:

Mycroft ai is an open source voice assistant platform where we can create skill how we want our voice assistant to respond.The main is to create a skill of voice assistant to respond for the user. what3words is a platform just like google maps to find location based on three words assigned to that particular column.In this project I created a mycroft skill of what-words-locations-skill in my github repository and required configuration files for the skill to respond.In this report I explained breifly how to create or develop a skill in your own picroft device and how to test your device how it works. The results of the project are obtained accurately and further development it can be used for and installed in your automobile and ask for the device to respond with the wakeword and helps you in guiding you to the destination.

Keywords:

Wakeword, utterance,dialog, intent, mycroft-skills, mycroft-skill-manager.

2 INTRODUCTION

Mycroft is an opensource voice assistant. It is developed by Joshua Montgomery in spring of 2015, has an idea to voice enable mark space. It can be run on many devices like Desktop, Linux, picroft(runs on raspberry pi), Mycroft Mark1 device. Why Mycroft why not Alexa, Siri, Google voice assistant it's because Mycroft is open source so that we can get into it and look into the code and you can create your own and let your device perform what actions you want that device is to performed whereas all other devices are like black box which are readily available for use but can't be able to modify or can't look inside them. Mycroft is lightweight and can be run on raspberry pi3 and more.

Picroft works on Raspberry Pi3, 4 connected to microphone and speaker. The entire picroft is available as a prebuilt micro-SD image which can be flashed and ready to use by placing into raspberry pi. lead.

PURPOSE

The main purpose of our project is to implement a voice assistant skill performed through picroft to recognize the three words or utterance given as input of voice and recognize the three words and give the output of the location. I think is a bit confusing, let me state it clear, we are going to use the what3words? What3words divided the world into 3 meter squares and has allotted the each square a unique combination of 3 words which is concatenated with full stop in between the words. That particular 3 words are allotted to that square will gives the exact location and exact latitudes and longitudes as accurate as for every 3 meters. It's the easiest way to share the exact locations and find the exact location.

Requirements

- Raspberry pi of version above 3
- Analog speaker to get the output through connected to 3.5mm jack on raspberry pi
- Microphone of usb connection which takes an input voice through microphone.
- 2.5 Amp power supply for rasp to function
- MicroSD card not less than 8gb
- HDMI monitor to get the display and keyboard to give inputs required.

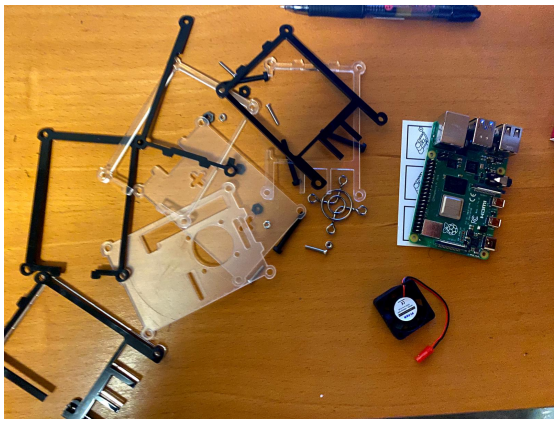

Figure 1: pre-setup of rasp

3 INSTALLATION SETUP

The main installation setup of picroft is after you place the picroft image into the sd card and inserting into raspberrypi. Make the necessary connections of power supply, keyboard, microphone, analog speaker using 3.5mm audio output jack . Make sure the picroft is connected to internet because the picroft doesn't work on offline and to view the display connect the rasp with the HDMI monitor and you can make necessary connections. When everything is set up normal the picroft prompts you display and provides you with guided steps,

"The Guided setup is comprising of 5 steps:

1. Set up the output audio
2. Let's test and set the volume
3. Ensure microphone is connected and select.
4. Test the microphone
5. Now you will asked to add the device to home.mycroft.ai"

How to pairup or add your device to Mycroft? There are certain commands in mycroft same as linux commands where you can check all the log outputs and process in the picroft device. To pair or add your device type mycroft-cli-client in the terminal so it pops up with one Log output where you will be able to check the pairup key for your device. Now login into you mycroft.ai account and set the device connection by giving the required parameters like Name of the device, Country, how your device has to respond, Voice accent. Then your device is paired and its now ready to use. This is the general setup installation of picroft in raspberyy pi. In picroft there are inbuilt of lot of skills like weather skills, time skills, remainders, google assistance, wiki skills and lot more which you can find in the official github repo which all that skils are inbuilt with the picroft.

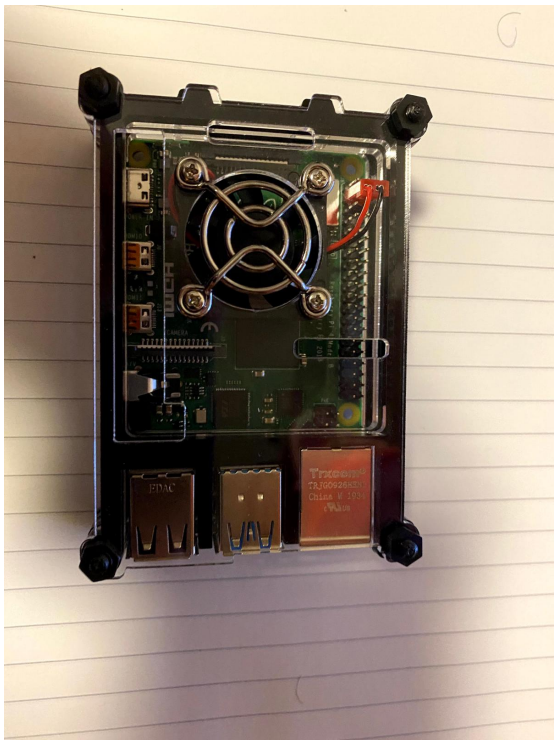

Figure 2: setup of rasp

3.1 Commands of picroft:

- mycroft-cli-client: This command will start the mycroft cli client if you are on linux command line.
- mycroft-help: This command gives up help information.
- mycroft-msk : Runs the mycroft skills kit.
- mycroft-msm : Runs the mycroft -skills-manager.
- mycroft-pip : Requires if you installing dependencies for skills runs pip with in the Mycroft Python virtual environment (venv)
- mycroft-setup-wizard: This command reruns the guided setup which allows to change the modifications of input or audio voice devices.
- mycroft-start : Launches or restarts the Mycroft services.

These are the some commands which we use in our implementation.

4 SKILL STRUCTURE

4.1 Skill:

The main task comes here that is creating the skill. Skill is terminology in the mycroft.ai to perform a task by your device, to make it happen you have built on your own skill. For our project I implemented the skill name what-words-locations-skills to allow picroft to get into that skill and return the output of the location of 3 words which are given as input.

Let's make a look now how to create or build a skill on your own?

"There are certain requirements to build a skill:
1. Git hub repository
2. Python Programming Language
3. Running Mycroft "

4.2 Skill Terminology:

The some new terms we will come to know when we develop a skill are:

utterance

An utterance is a phrase spoken by the User, after the User says the Wake Word. what's the weather like in Toronto? is an utterance.

dialog

A dialog is a phrase that is spoken by Mycroft. Different Skills will have different dialogs, depending on what the Skill does. For example, in a weather Skill, a dialog might be the.maximum.temperature.is.dialog.

intent

Mycroft matches utterances that a User speaks with a Skill by determining an intent from the utterance. For example, if a User speaks Hey Mycroft, what's the weather like in Toronto? then the intent will be identified as weather and matched with the Weather Skill. When you develop new Skills, you need to define new intents takes an input voice through microphone.

4.3 Skill Structure:

The skill is made up of number of files and folders like vocab, dialog and locale directories.

The dialog, vocab, and locale directories contain subdirectories for each spoken language the skill supports. The subdirectories are named using the IETF

language tag for the language. For example, Brazilian Portugues is 'pt-br', German is 'de-de', and Australian English is 'en-au'.

By default, your new Skill contains one subdirectory for United States English - 'en-us'. If more languages were supported, then there would be additional language directories.

Dialog Directory

There will be one file in the language subdirectory (ie. en-us) for each type of dialog the Skill will use. Currently this will contain all of the phrases you input when creating the Skill.

When instructed to use a particular dialog, Mycroft will choose one of these lines at random. This is closer to natural speech. That is, many similar phrases mean the same thing.

For example , how the picroft respond to address?
The location of
The coordinates of
The location of what3words is

Vocab Directory

Each Skill defines one or more Intents. Intents are defined in the vocab directory. The vocab directory is organized by language, just like the dialog directory.

We will learn about Intents in more detail shortly. For now, we can see that within the vocab directory you may find multiple types of files:

- .intent files used for defining Padatious Intents
- .voc files define keywords primarily used in Adapt Intents
- .entity files define a named entity also used in Adapt Intents

This .intent file contains all the sample utternaces when we create the skill.

5 Mycroft Skills Kit

The Mycroft Skill Kit is denoted by –msk- It's a python based utility that has been created to make it easier for Skill Authors to create, test and submit Skills

Msk supports following feature:

- Create a new Skill
- Create an intent test for skill
- Upload a Skill

- Upgrade an existing Skill

6 How to create a Skill?

Generally, MSK comes pre-installed on Mark1, picroft. If not available with the pre-installed we can install it by command pip3 install msk. This will collect the required packages for the SKill to create.

To Create a SKILL:

Command to create a Skill: msk create or mycroft-msk-create(This pops up a the steps below)

Create:

"There are certain steps and inputs are to be given when creating a skill. The following steps are:
1.Enter a Short Unique Skill Name: what- words-locations (This doesn't take numbers and special characters)
2.Class name: whatwordslocationskills
3.Repo name: what-words-locations-skill
4.Enter some example phrases to trigger your skill

- what3words
- find the location
- the threewords are
- find the cordinates of
- find the address
- address for

5. Enter what your skill should say to respond:

- The location is
- The cordinates of
- location for what3words is

6. Enter a one-line description for your skill:

- My work is to find the location of what3words
- If the person gives the input of 3words , It will find the location of that particular 3words allotted for a particular square.

7. Enter author: Kamireddy0308 (git hub repo)
8. Go to Font Awesome(fontawesome.com/choatsheet) and choose an icon:

   - Enter the name of the icon: compass(you can choose what icon you wish to keep for your repo I choose to compass because like for sign of map)

9.Pick a color for your icon. Find a color that matches the color scheme at mycroft .ai/colors, or pick a color at: color-hex.com.
10.Categories define where the skill will display is the Marketplace. It must be one of the following: Daily,Configuration,Entertainment, Information, IOT, Music Audio, Media, Productivity, Transport,

   - Enter the primary category for your skill:
     Information, Transport

11. Enter tags to make it easier to research for your skill(optional)

   - Map, Maps, Location, Latitudes and longitudes

12. For uploading a skill a license is required.

   - Apache 2.0, GPL v3.0, MIT

13.To authenticate with Github a Personal Access token is needed.

   1. Go to your github repo created one
   2. Give the token a name like mycroft-msk
   3. Select the scopes
   4. Click Generate Token (at bottom of page)
   5. Copy the generated token
   6. Paste the generated token in terminal

After performing all the steps, the GitHub repo is created with all the files like locale/en-us which contains dialog and intent files, license.md, readme.md, init file, manifest, settingsmeta.

7 Testing your skill

How to test your skill? Now after performing all the steps above have to code for the skill and the code should be based on the skill structure required for the particular skill like how your skill has to perform or work. Our skill is to find the location of 3 words given by the user and based on this,implement the skill in Python Programming Language.

what3words API:

what3words provides the api(Application Programming Interface) to both the conversions,api for conversion of words into coordinates and coordinates into locations. It gives the following output values as country, nearestPlace,map,language,words,coordinates of latitudes and longitudes.

After creating skill commit your changes in to the repository

Commands to test your skill:

1. **msm-install-your github repo link**:
   This command will install the skill into your own picroft device where the preinstalled microft skills present in mycroft core directory
   By installing this skill only you will be able to test the skill.

2. **msm-list :**
   This command will gives you all the skills present in the device, can check whether the skill which installed is present in the picroft.

3. **msm-remove-skillname**:
   This command helps you in removing the already installed skill from the device

8 CONCLUSION AND FUTURE SCOPE

From this skill, when the user given an input of 3 words will get the exact location of that particular square of values like country, nearestplace, coordinartes, etc. The result is uttered by the device as output through which you have opted in the guided setup for the audio output, meanwhile the results can also be displayed in the mycroft-cli-client(where the log outputs and inputs that are performed by the device is visible. The goal of the project is to find exact location which we accomplished by creating the skill in the mycroft skills.

Future Scope

As a future work I am anticipating more input errors like when the user gives the input the device unable to exactly identify the pronunciation as uttered by the user.And the beginning and ending recording or listening time is not that sufficient to utterance some typical words. I likewise plan to do an exhaustive component that helps in increasing the listening time of the device so that it can wait until the user pronounced all the inputs.

9 References:

1. https://mycroft-ai.gitbook.io/docs/
2. https://github.com/MycroftAI/mycroft-skills

Own Repo:

3. https://github.com/Kamireddy0308/what-words-locations-skill

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10 Appendix:

Result of logoutputs how skill is responding:

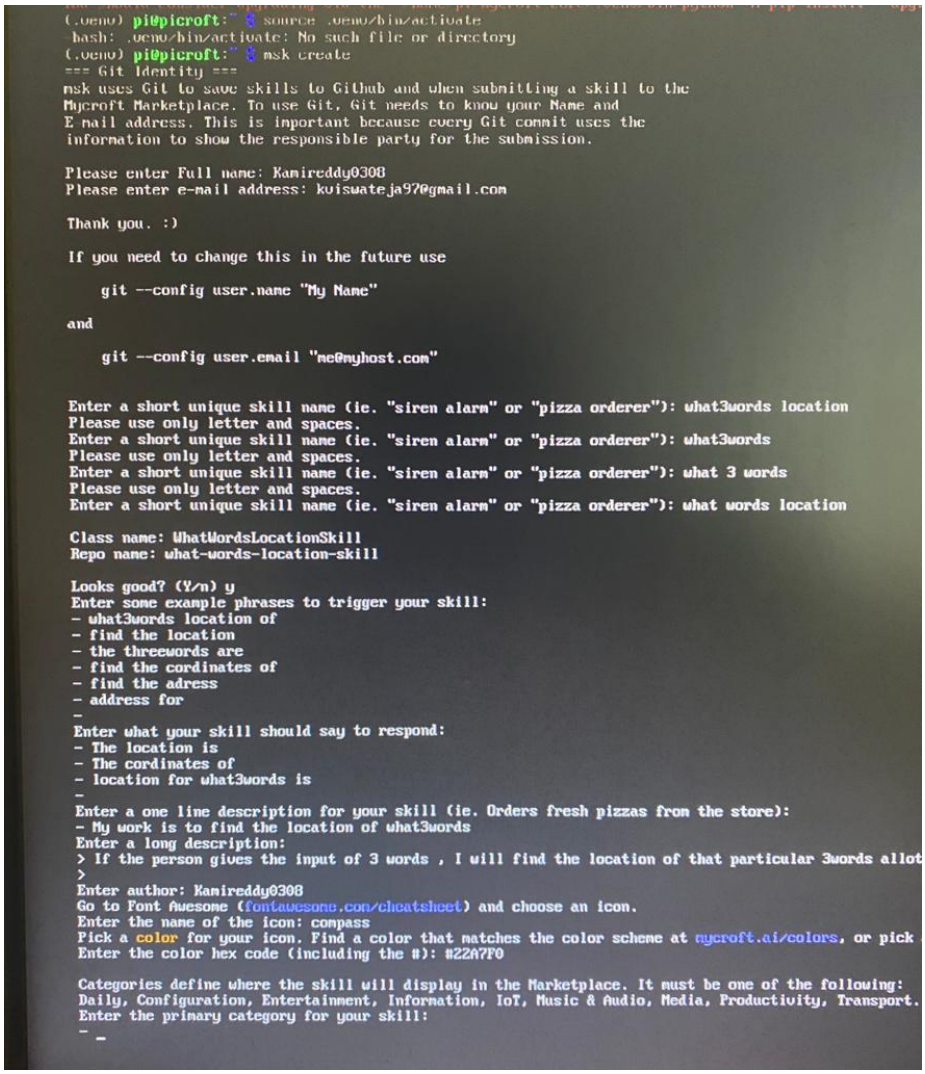

Figure 3: Creating a skill

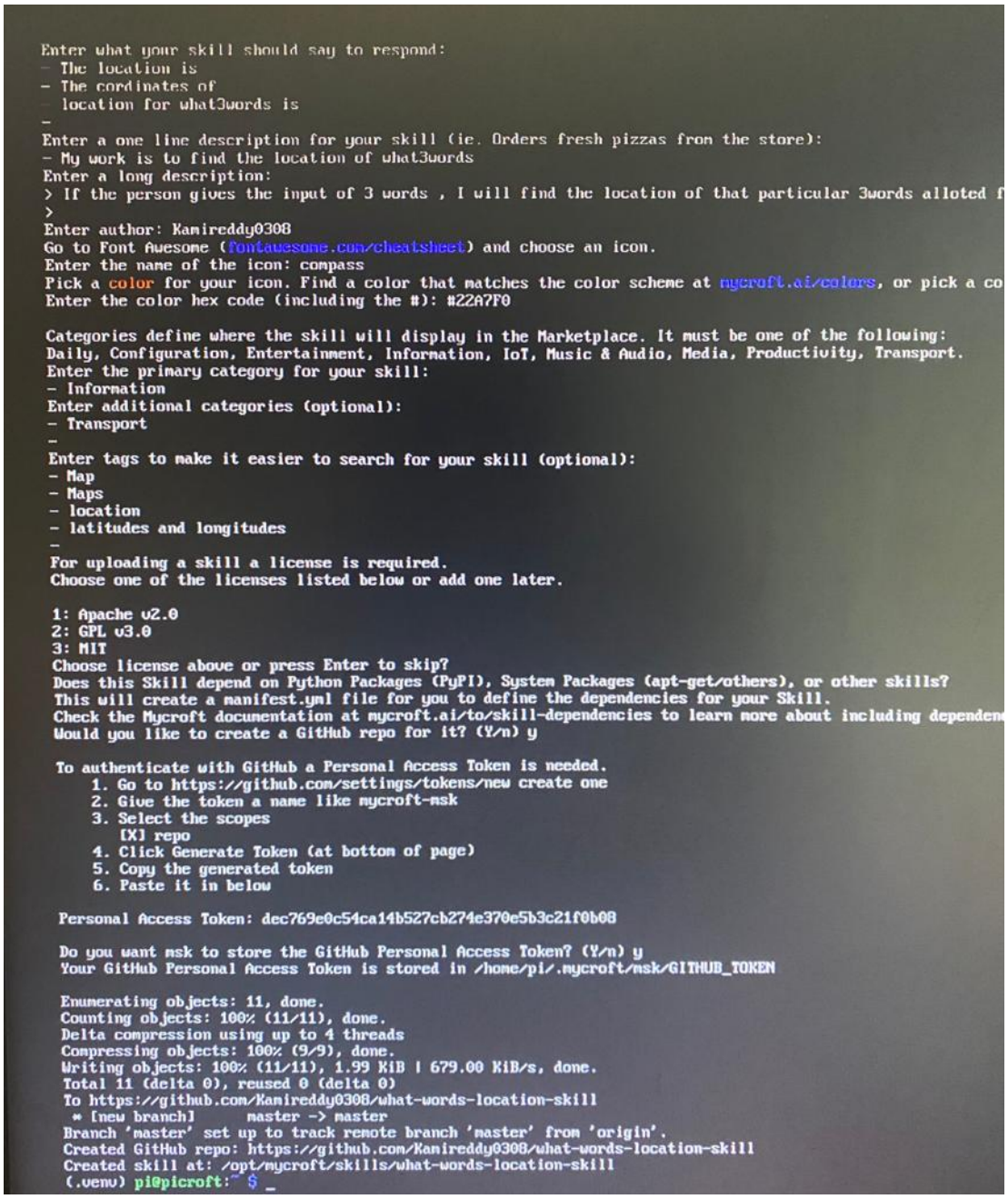

Figure 4: Creating a skill

Figure 5: mycroft-cli-client log output

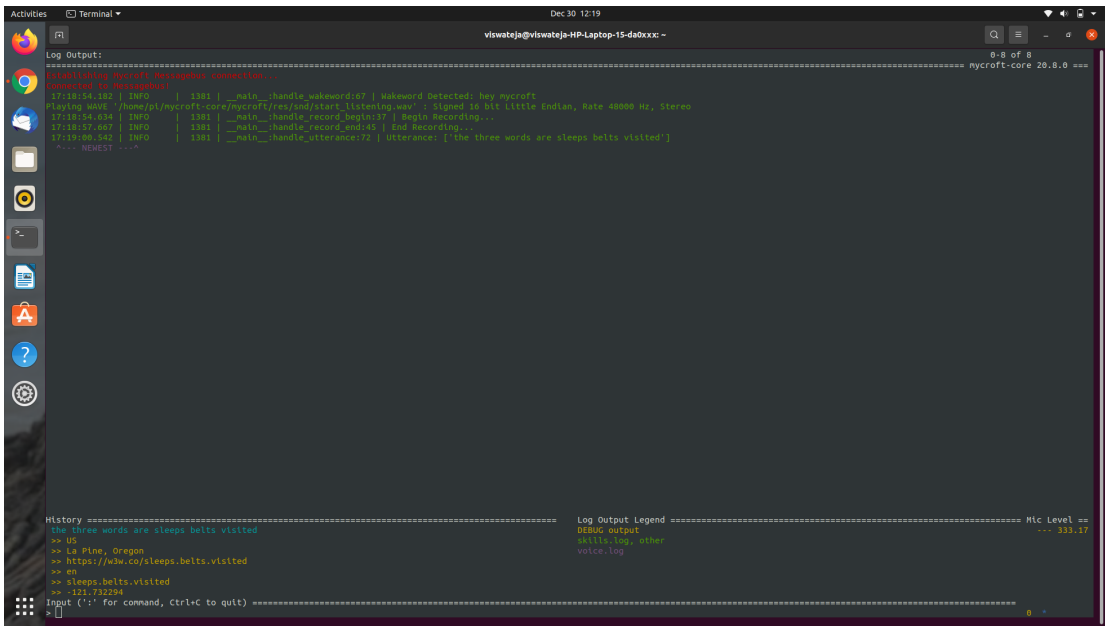

Figure 6: output of location using voice input

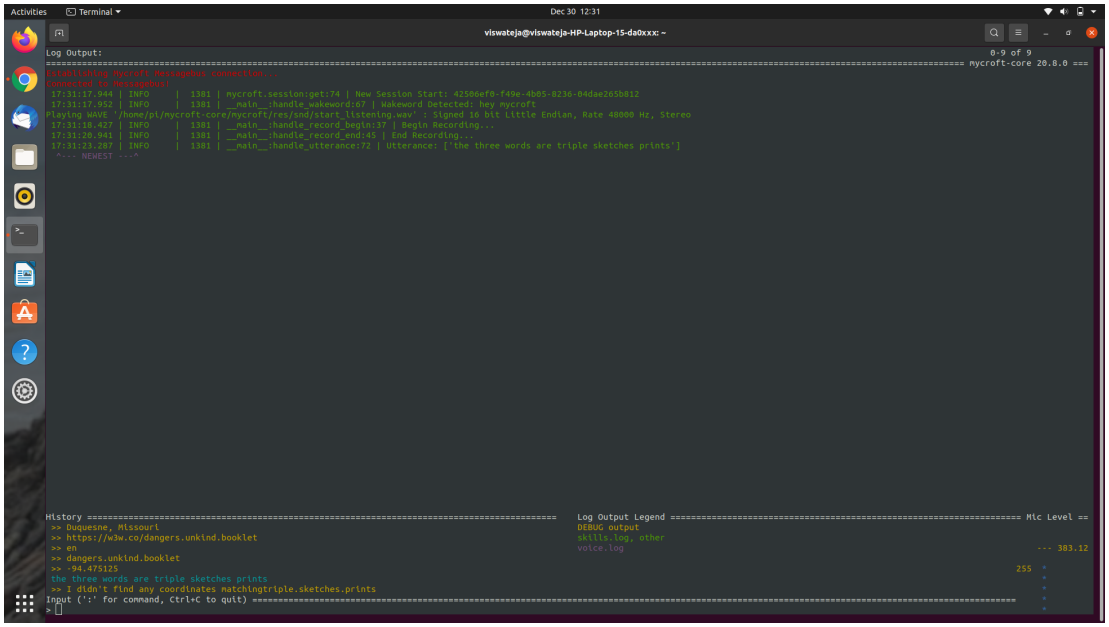

Figure 7: output of location if that words are not assigned

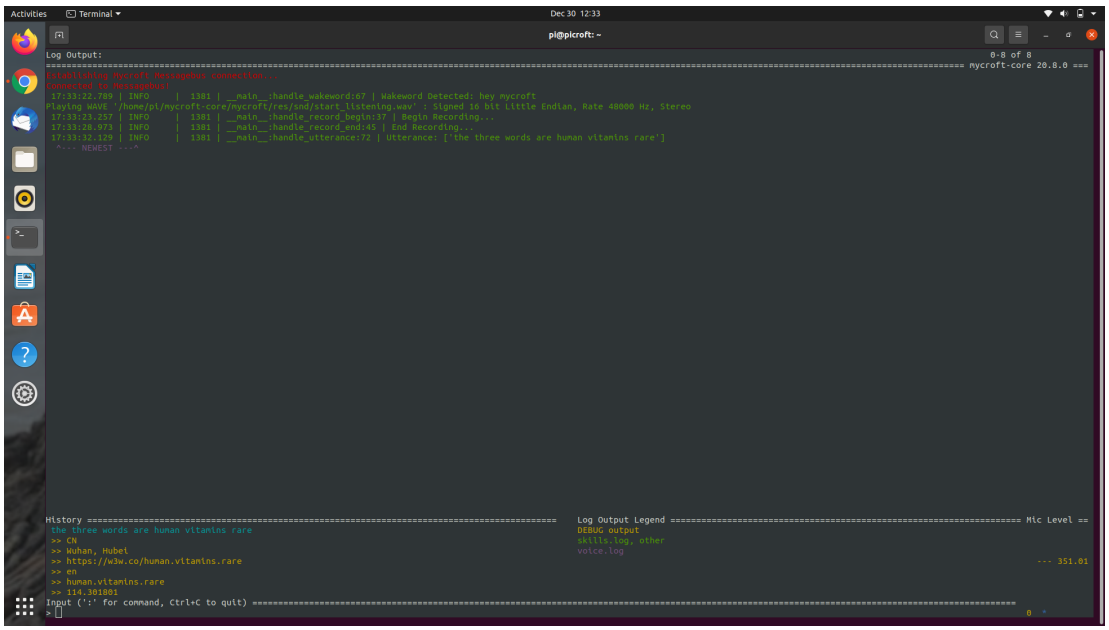

Figure 8: The location where this corona had origin