NOMAD Documentation

Release 1.0.2

daPiddler

Jul 05, 2018

CONTENTS

CODE

nomad.**ai_loop**()
    Main obstacle avoidance loop

nomad.**change_path**()
    stores distance values and calls function

nomad.**check_kill_process**(*pstring*)
    Kills python process

        Parameters **pstring** – process name

        Returns N/A

        Return type N/A

nomad.**compare_distance**(*leftUnit*, *rightUnit*)
    compares values and moves robot

        Parameters

            • **leftUnit** (*int*) – ultrasonic reading left

            • **rightUnit** (*int*) – ultrasonic reading right

        Returns N/A

        Return type N/A

nomad.**forward**(*tf*)
    move forwards

nomad.**init**()
    setup GPIO Pins

nomad.**left**(*tf*)
    pivot left

nomad.**main**()
    main loop

nomad.**message**(*input*)
    sends current status to flask server

        Parameters **input** (*string*) – message to be sent

        Returns N/A

        Return type N/A

nomad.**reverse**(*tf*)
    move backwards

nomad.**right**(*tf*)
> pivot right

nomad.**servo_center**()
> Physically move servo to center position

nomad.**servo_left**()
> Physically move servo to left most position

nomad.**servo_right**()
> Physically move servo to right most position

nomad.**set_servo_pulse**(*channel*, *pulse*)
> Helper function to make setting a servo pulse width simpler

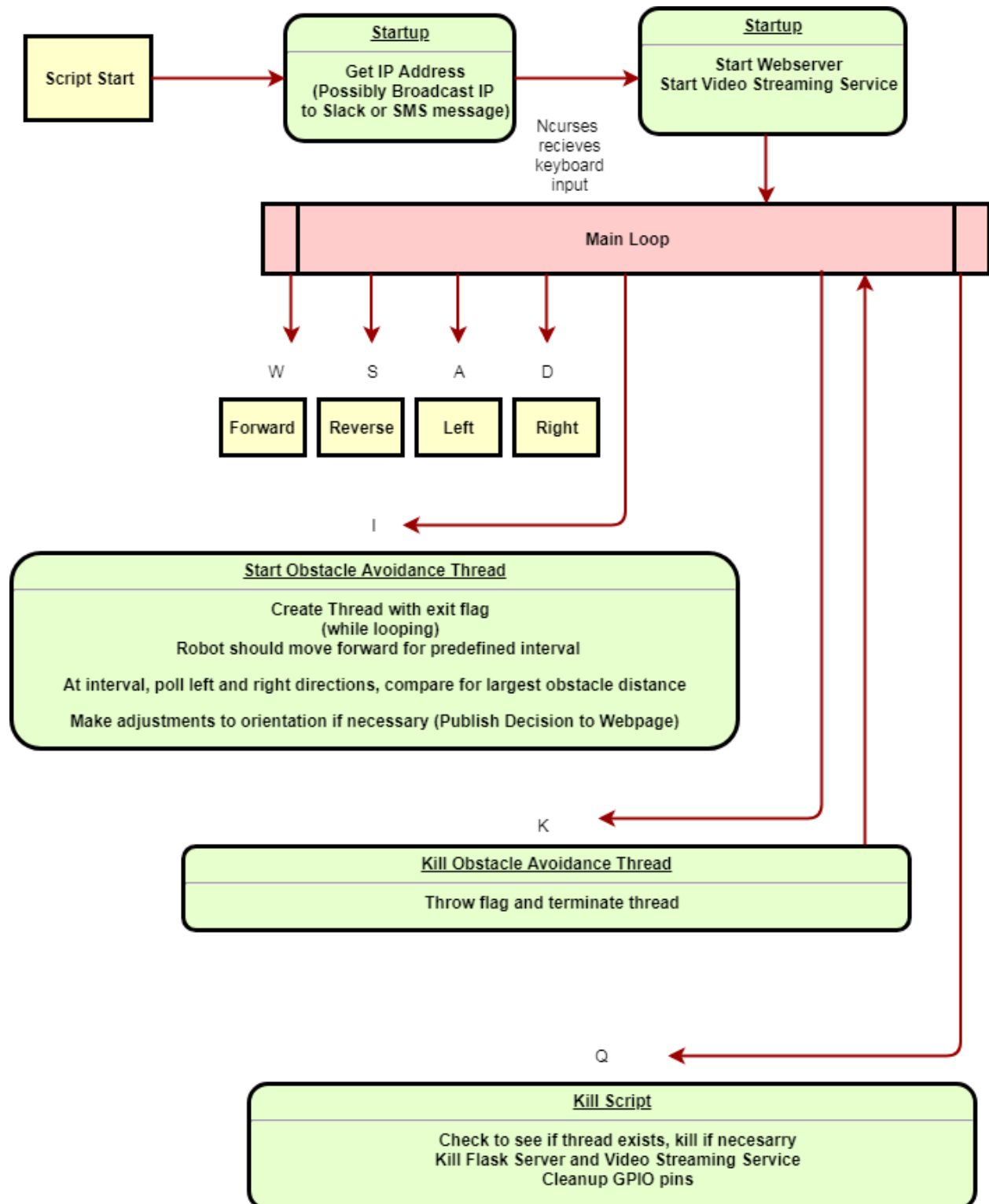nomad.**shutdown**()
> Shutdown Script/Cleanup

nomad.**spawn_thread**(*arg*)
> create AI thread with exit flag

nomad.**stop**()
> dead stop

DESIGN

Core Logic

Script Start

Startup

Get IP Address
(Possibly Broadcast IP
to Slack or SMS message)

Ncurses
recieves
keyboard
input

Startup

Start Webserver
Start Video Streaming Service

Main Loop

W

S

A

D

Forward

Reverse

Left

Right

I

Start Obstacle Avoidance Thread

Create Thread with exit flag
(while looping)
Robot should move forward for predefined interval

At interval, poll left and right directions, compare for largest obstacle distance

Make adjustments to orientation if necessary (Publish Decision to Webpage)

K

Kill Obstacle Avoidance Thread

Throw flag and terminate thread

Q

Kill Script

Check to see if thread exists, kill if necesarry
Kill Flask Server and Video Streaming Service
Cleanup GPIO pins

DEPLOYMENT

3.1 Deployment Process

Steps:

1. On raspberry pi clone git project: https://github.com/dapiddler/NOMAD.git

2. pip install requirements.txt (install uv4l as well https://www.linux-projects.org/uv4l/installation/)

3. run python script "nomad.py"

4. open browser and navigate to url http://{[}RPI-IP{]}:5000/nomad/

3.2 Notes:

- There is an assumption that you have not set a static IP for your RPI. If not, you can check your router for your RPI-IP or use NMAP to scan your network

FOUR

USAGE

4.1 NOMAD Operation

Commands:

1. press W key to move Nomad forward

2. press S key to move Nomad reverse

3. press A key to move Nomad left

4. press D key to move Nomad right

5. press I key to initiate auto-navigation

6. press K key to kill auto-navigation

7. press Q key to shutdown Nomad/halt script

n

nomad, **??**