KTH Mechatronics Advanced Course

MF2063, HT 2018

FINAL REPORT

ESS-NW/ESS-CAR

Jonas Ekman
Yini Gao
Jacob Kimblad
Leon Fernandez
Fredrik Hyyrynen
Yifan Ruan

December 8, 2018

Abstract

Abstract starts here, what should be included:
The problem issue subject being addressed
How the problem is tackled
Overview of the results, and indication as to what level they solve the problem.
Implications of the results

Contents

List of Figures

List of Tables

1 Introduction

This report presents the process and results of two projects "Embedded Service for Self-adaptive Network" (ESS-NW) and "Embedded Service for Self-adaptive Car" (ESS-CAR). This chapter will start by describing the background of the two projects. The next thing to be described is formulation, goals and motivation of the two projects. Following this will be a short discussion on the delimitations for our team. The last part of this chapter will present an explicit report disposition which helps readers to get a sense of the overall report.

1.1 Background

1.1.1 Background subsection blabla

1.2 Project Description

1.2.1 Project Description sub blabla

1.3 Delimitations

1.4 Report disposition

2 Literature Review and State of the Art

3 Methodology

3.1 Engineering approaches ?

3.2 Tool-chains ?

3.3 Project management

Scrum project management is used during the process of our projects.

4 Implementation

4.1 System overview

maybe put communication diagram here

4.2 Implementing SDN network

4.3 Communication between Beaglebone and Arduino ?

4.4 Sensors

Three categories of sensors are implemented in the prototype vehicle to monitor its surrounding environments. Data from distance sensors and speed sensor will be sent to an Arduino initially, then sent to corresponding Beaglebone. Data from Pi Camera will be sent to the Raspberry Pi which is directly connected to the main network.

4.4.1 Ultrasonic sensor

To get data from HC-SR04, a short 10µs pulse should be supplied to the trig pin of ultrasonic sensor, then the sensor will send out an 8 cycle burst of ultrasound at 40 kHz and raise echo. The echo signal we get is a distance object which is pulse width and the range of the signal is in proportion.

An Arduino Micro handles both the generating the trig pulse and interpreting the echo signal. The Arduino will set the output pin to low, wait for 5ms, set the pin to high, wait for 10ms, set the pin back to low. This is the process of generating the trig pulse. After the Arduino sends out the trig pulse, it waits for 2 ms, then reads the value from the pin connected to sensor's echo pin. The last step is convert the received value to distance in unit of centimeter.

4.4.2 Reflective object sensor

4.4.3 Camera

4.5 Controlling actuators

4.5.1 Steering servo

4.5.2 Motor ESC

4.6 Assemble the car, power supply, etc

5 Verification and Validation

6 Results

7 Discussion and Conclusion

8 Future Work