HO CHI MINH CITY UNIVERSITY OF TECHNOLOGY
FACULTY OF TRANSPORTATION ENGINEERING

DESIGN OF MITSUBISHI XPANDER OXYGEN SENSOR VOLTAGE SIGNAL SIMULATOR

Student's name: LÊ ANH ĐỨC- 1852327

Instructor: Ph.D. TRẦN ĐĂNG LONG

I. INTRODUCTION

- Project on The Mitsubishi Xpander Oxygen Sensor Voltage Signal .
- The aim of the project is to simulate 2 signals OS1 and OS2 (Oxygen sensor Signal 1 and Oxygen sensor Signal 2).
- The requirement of the project that the output signals closely resembles the oxygen sensor signals of Mitsubishi Xpander.

1. General information

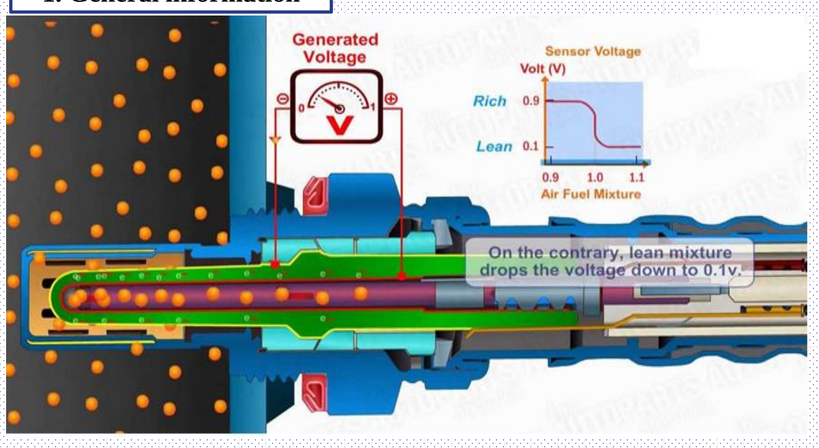

Figure 1.1: Narrow-band oxygen sensor

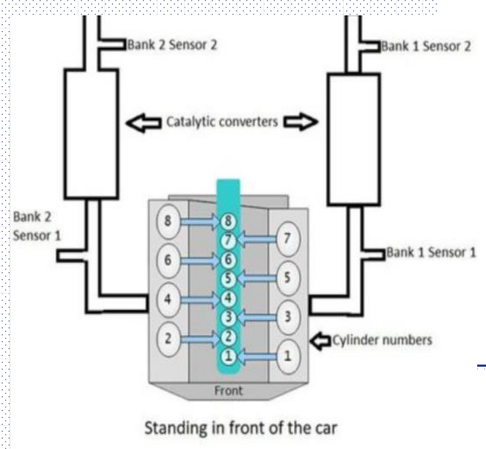

Figure 1.2: Location oxygen sensor

- Located within the emissions control system.
- Ensure that the engine is running at top condition
- The differences in oxygen levels between the bulb and the outside atmosphere generates voltage.

II. GENERAL LAYOUT DESIGN

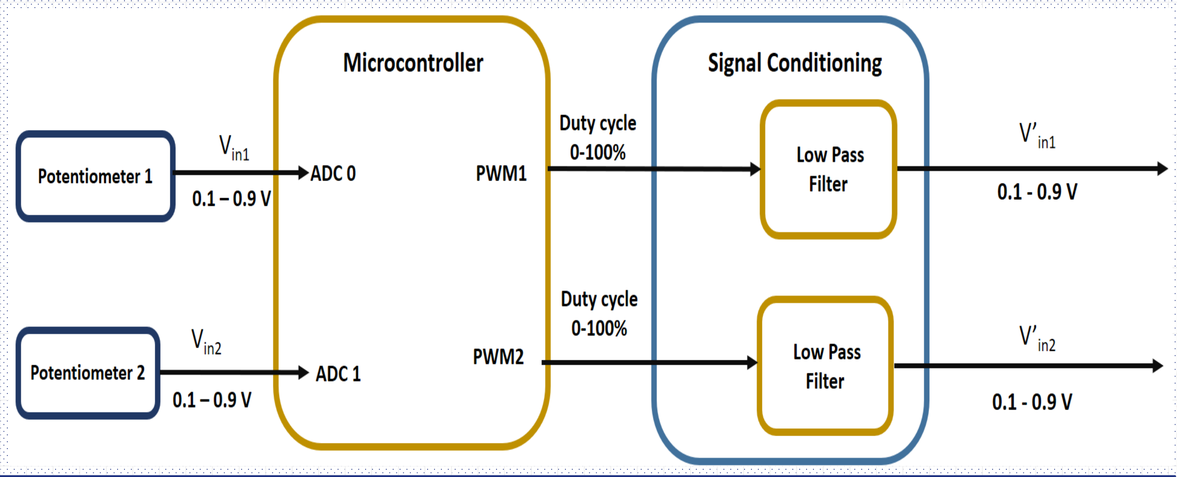

Figure 2.1: Structure diagram of oxygen sensor simulator

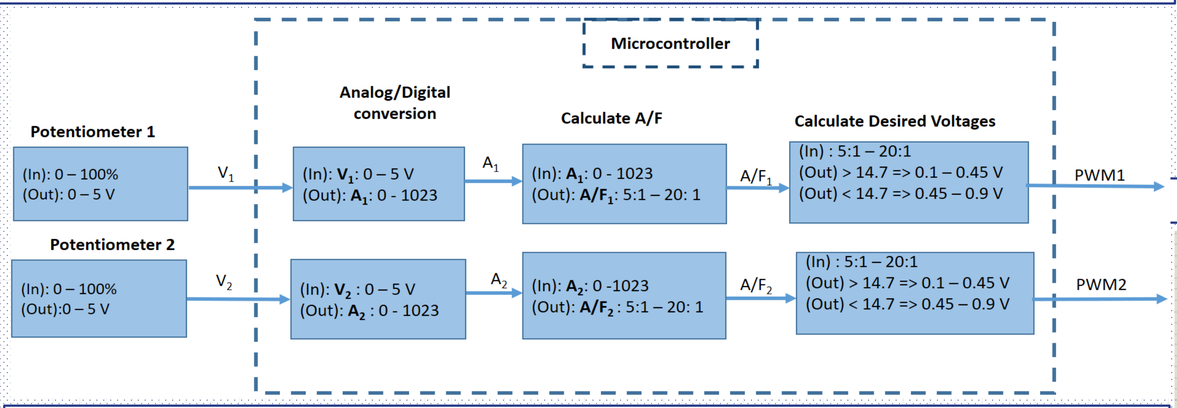

Figure 2.2: Principle diagram of oxygen sensor simulator

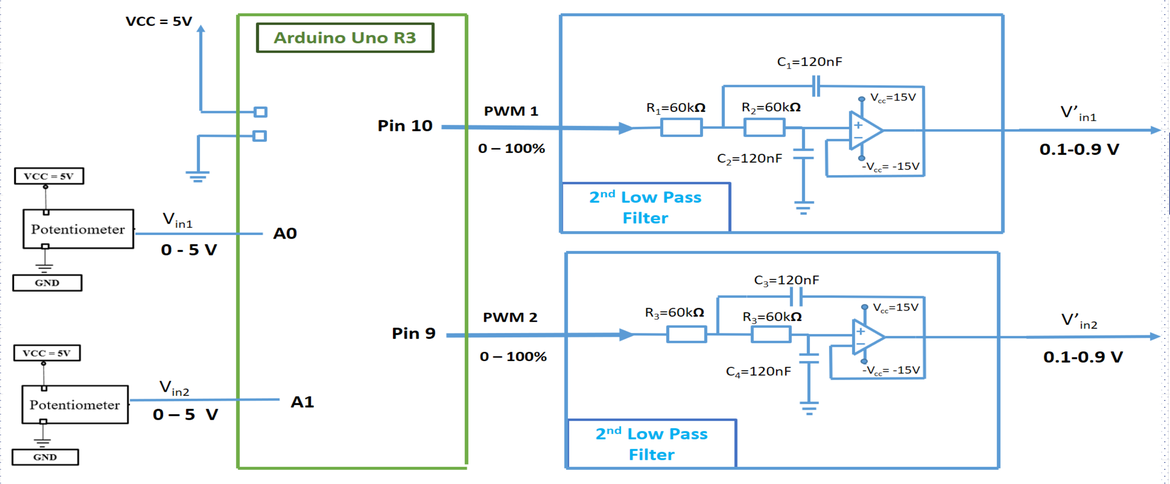

Figure 2.3: Electrical scheme

III. TECHNICAL DESIGN

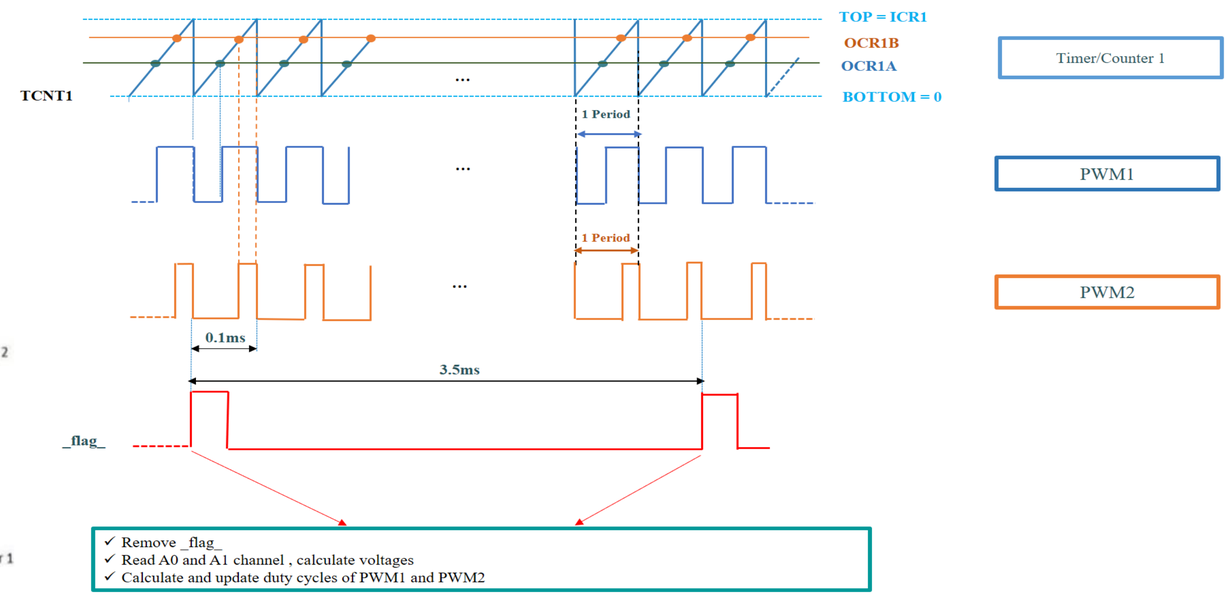

Figure 3.1: Timing diagram of the program

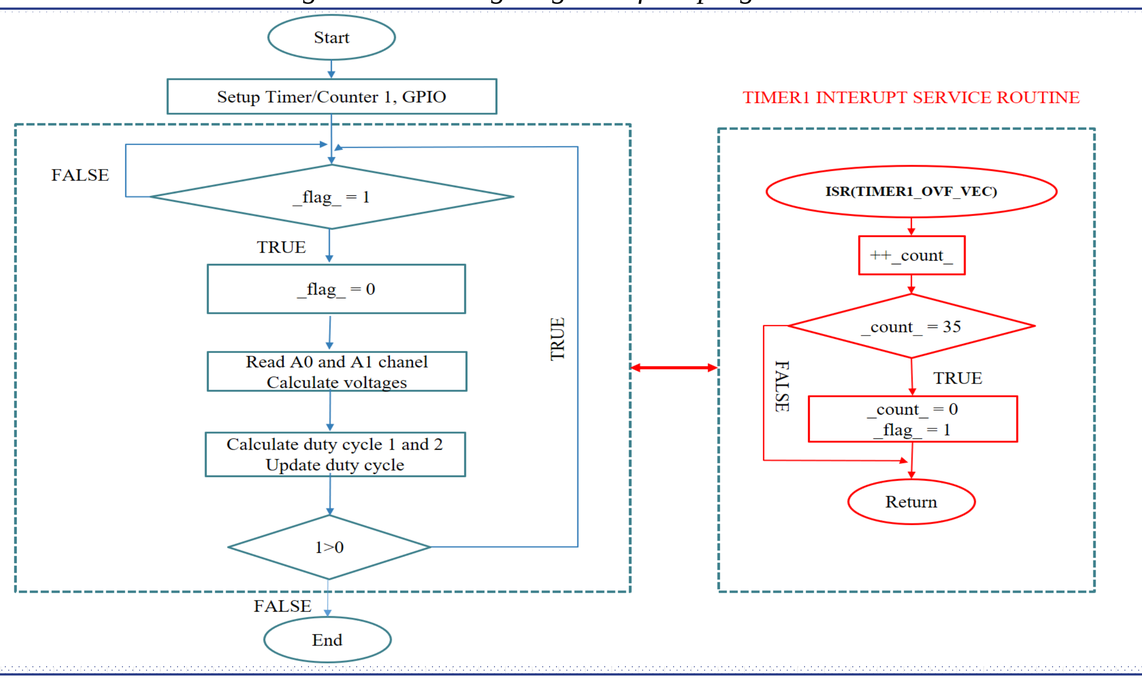

Figure 3.2: Algorithms diagram of the program

IV. SIMULATION AND RESULTS

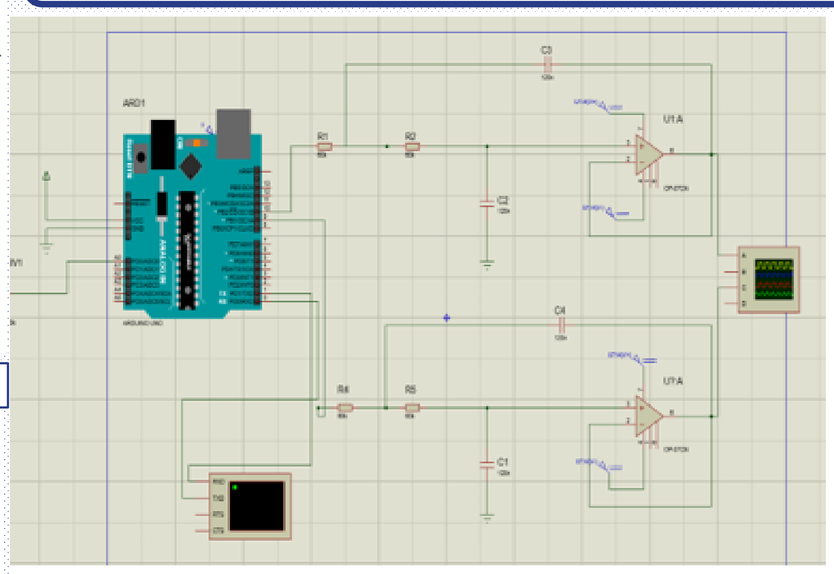

Figure 4.1: Electrical diagram in Proteus Simulation

1. Simulation:

The simulation will depend on the electrical scheme to check the result:

1) Create a input signal change continuously from 0-100% like the A/F ratio of 2 oxygen sensor 1 and 2 at pin A0 and A1
2) The two simulation signals OS1 and OS2 will display on screen through port A and C.
3) Pin RXD and TXD on Arduino are connected to pin TXD and RXD on Virtual Terminal to display voltage value of two signals OS1 and OS2.

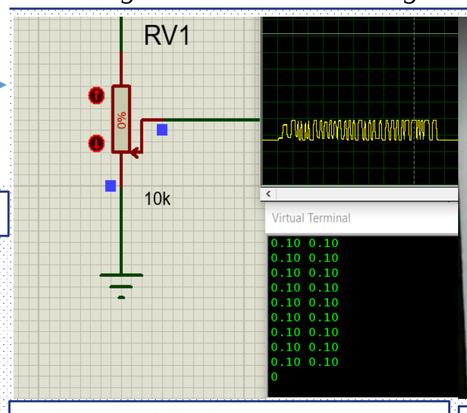

Figure 4.2: Oxygen signal in simulation of sensor1

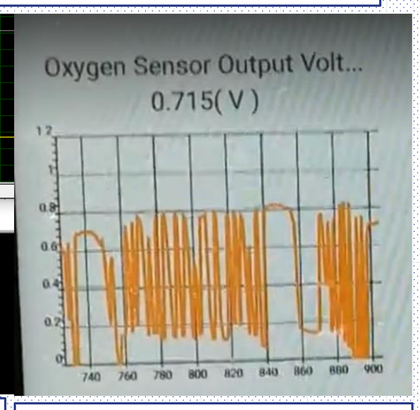

Figure 4.3: Actual Oxygen signal of sensor1

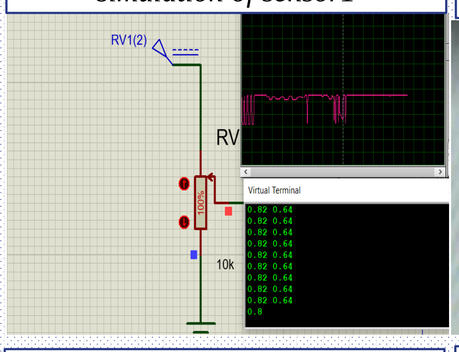

Figure 4.4: Oxygen signal in simulation of sensor2

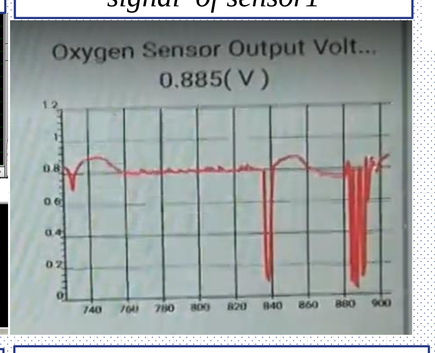

Figure 4.5: Actual Oxygen signal of sensor2

2. Discussion:

Satisfied:

- ✓ Calculate the voltage value and display the PWM with low error.
- ✓ Simulating the signal as the actual oxygen sensor.

Unsatisfied:

- ✓ The shape of pulse is still not smooth.
- ✓ Potentiometer can't give signal like oxygen voltage so the pulse signal cannot as exact as reality.