HO CHI MINH CITY UNIVERSITY OF TECHNOLOGY
FACULTY OF TRANSPORTATION ENGINEERING

DESIGN OF MITSUBISHI XPANDER ACCELERATOR PEDAL POSITION SIGNAL SIMULATOR

Student's name: Âu Dương Huê - 1752220

Instructor: Ph.D Tran Dang Long

I. INTRODUCTION

- Project on The Mitsubishi Xpander Accelerator Pedal Position Signal .
- The aim of the project is to create 2 signals APS1 and APS2 (accelerator pedal signal 1 and accelerator pedal signal 2).
- The requirement of the project that the output signals closely resembles the accelerator pedal signals of Mitsubishi Xpander.

1. General information

- The pedal opening based on Hall effect principle will create the voltage of the 2 signal pins (Signal) sensor.
- Two pedal sensor signals are requirements for safety and reliability of information.

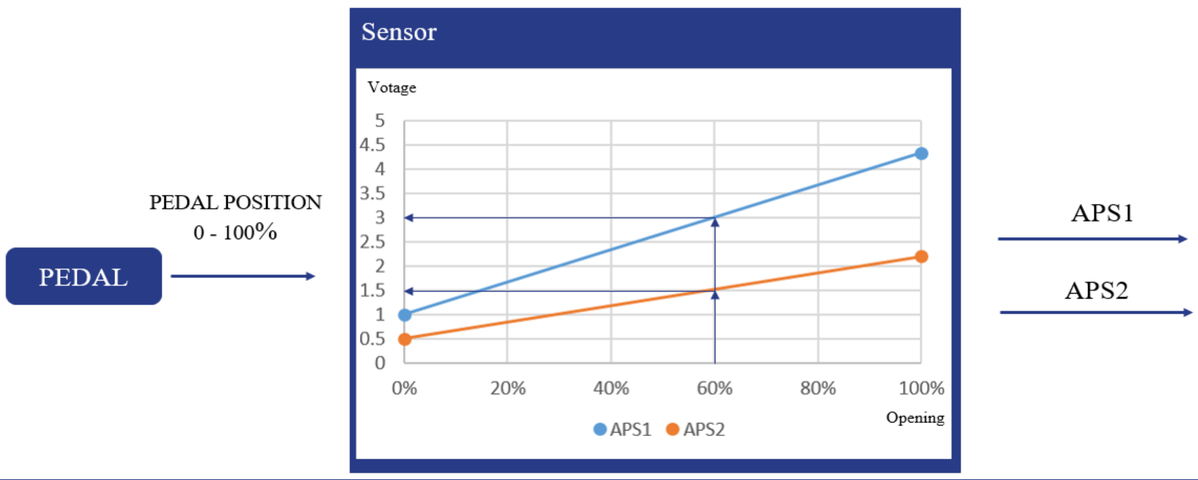

Figure 1.1: Pictorial diagram showing the principle of the Mitsubishi Xpander accelerator pedal signal.

2. Measuring method

Using potentiometer to control the input signal → Using Arduino to calculate voltage value → Using Low pass filter to reshape output signals

II. GENERAL LAYOUT DESIGN

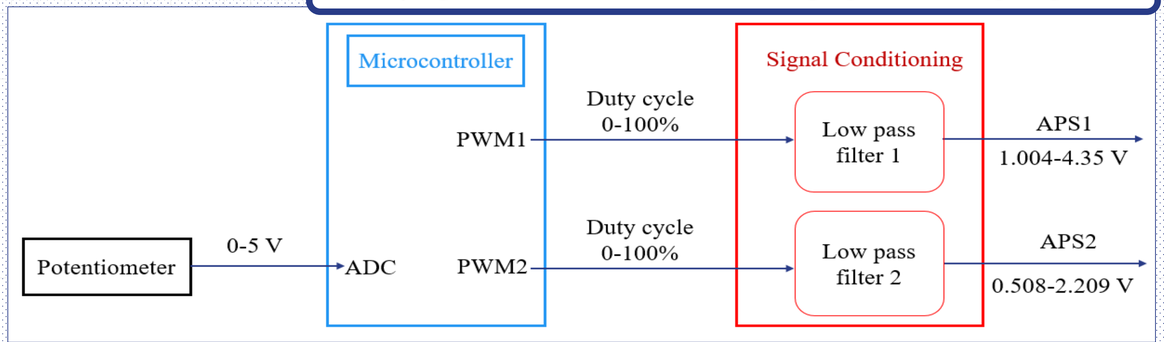

Figure 2.1: Structure diagram of accelerator pedal simulator

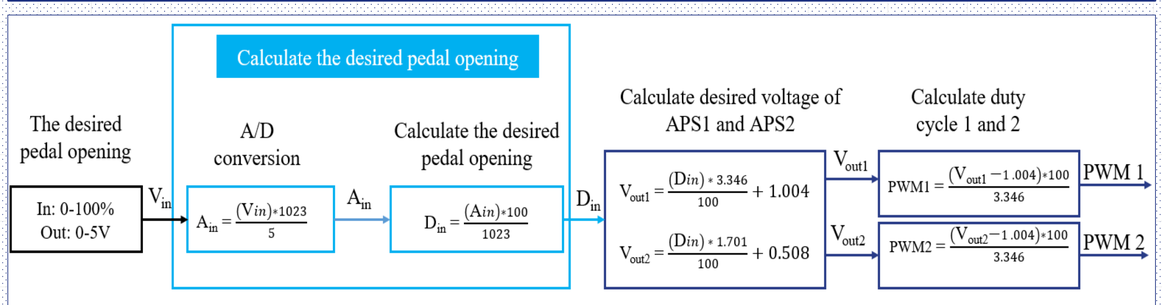

Figure 2.2: Principle diagram of accelerator pedal simulator

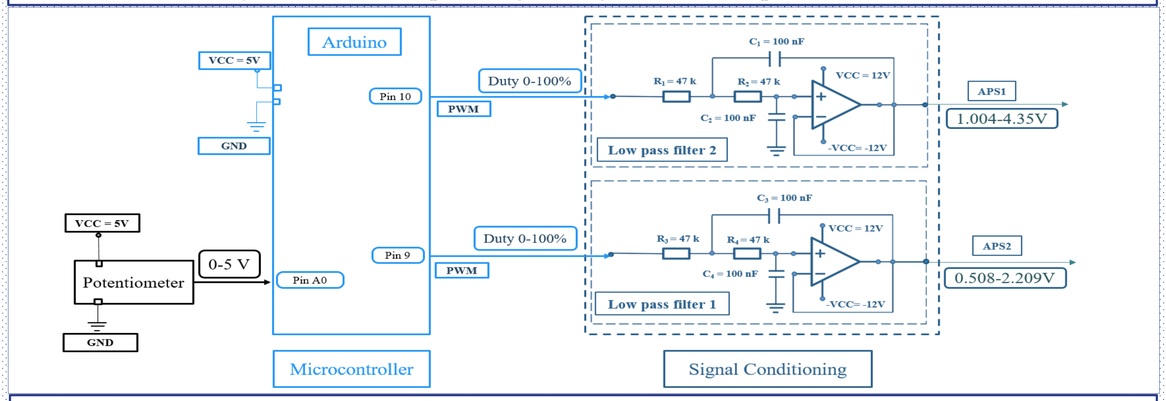

Figure 2.3: Electrical scheme

III. TECHNICAL DESIGN

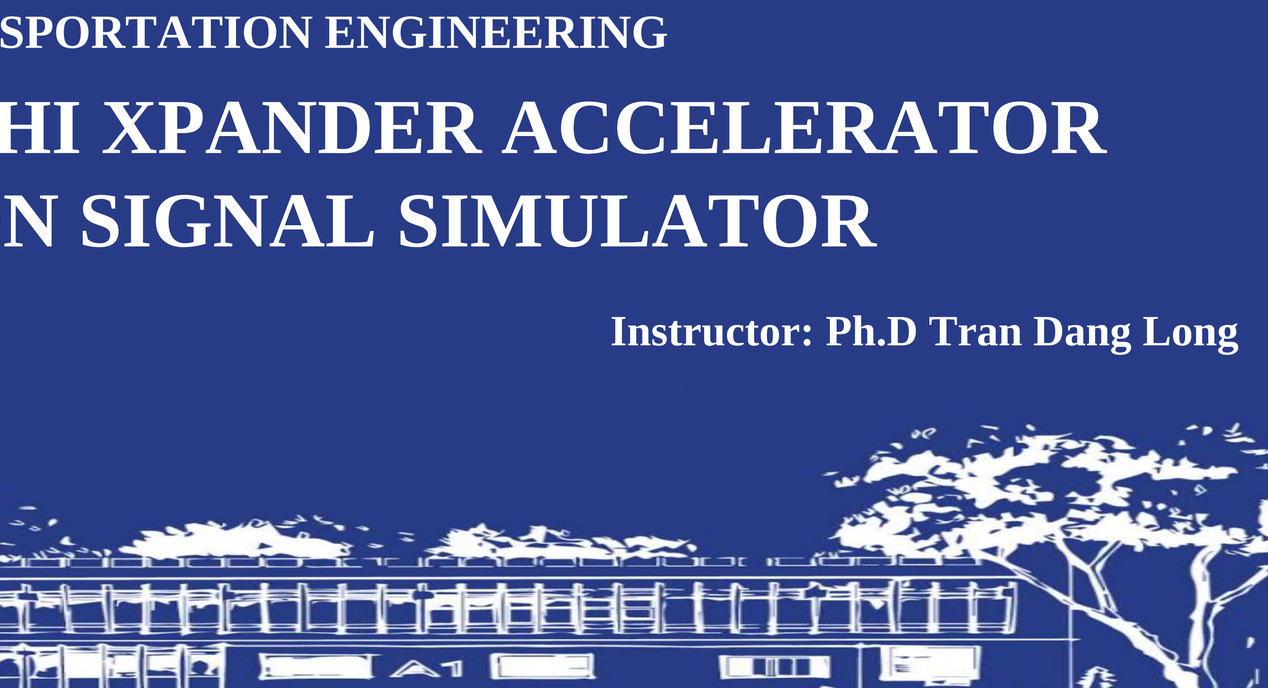

Figure 3.1: Timing diagram of the program

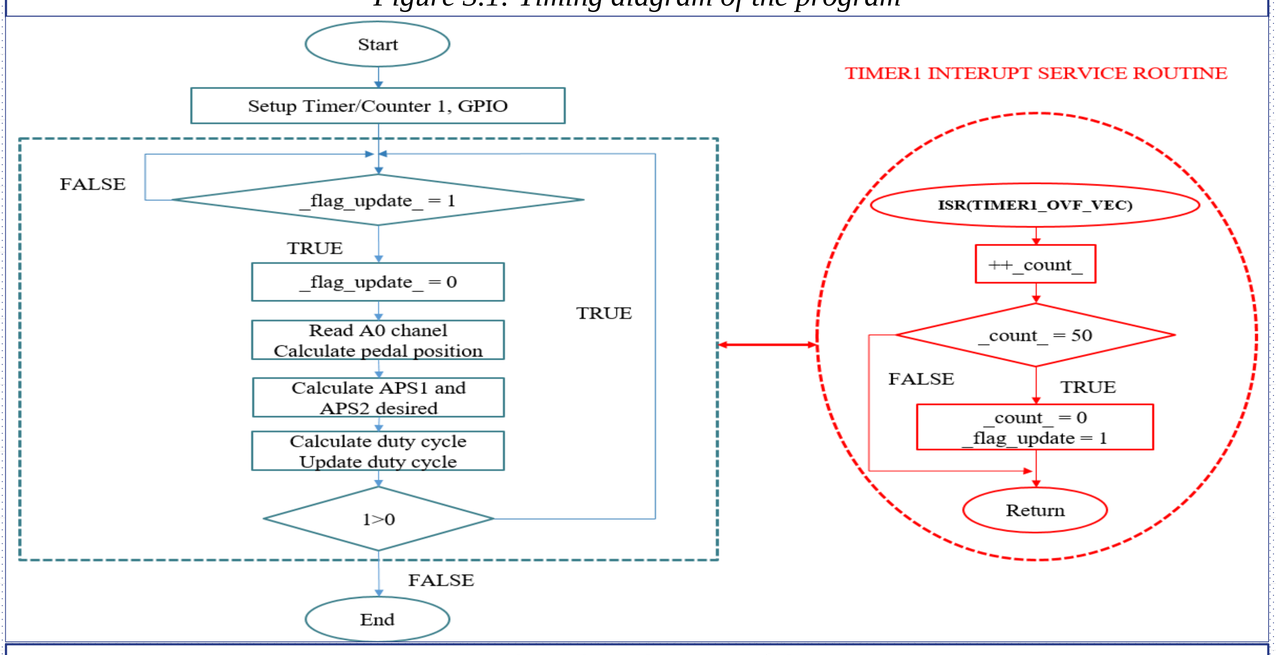

Figure 3.2: Algorithms diagram of the program

IV. SIMULATION AND RESULTS

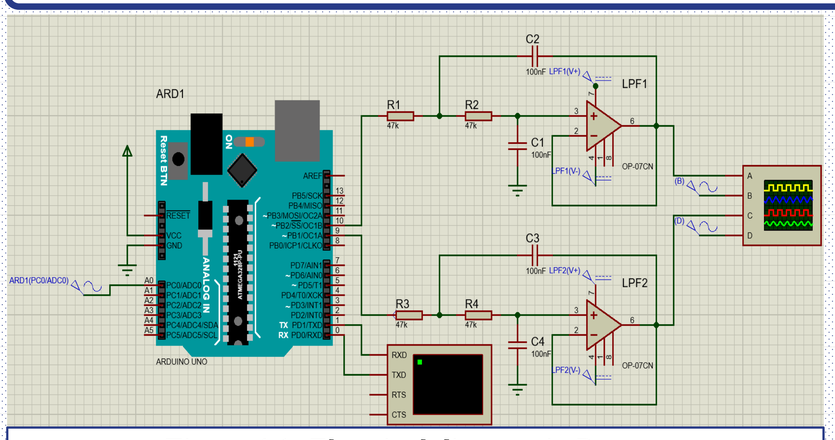

Figure 4.1: Electrical diagram in Proteus

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 pedal opening at pin A0.
2) The two actual signals APS1 and APS2 will display on screen through port A and C.
3) The two desired signals APS1 and APS2 will display on screen through port B and D.
4)) Pin RXD and TXD on Arduino are connected to pin TXD and RXD on Virtual Terminal to display voltage value of two signals APS1 and APS2.

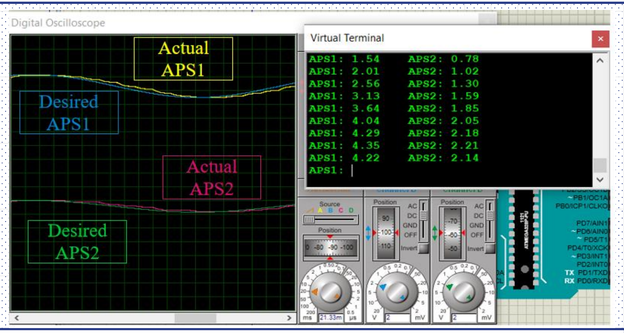

Figure 4.1: The result display on the screen

2. Discussion:

Satisfied:

- ✓ Calculate the voltage value and display the PWM with low error.
- ✓ Generate voltage values nearly the same with the reality value of Mitsubishi Xpander.

Unsatisfied:

- ✓ The voltage values are rounded up which cause some errors.
- ✓ Potentiometer can't give signal like pedal so the pulse signal cannot look like the reality.

Accelerator pedal signal	Actual	Desired	ERROR
APS1 at 0% pedal opening	1	1.004	0.4%
APS2 at 0% pedal opening	0.51	0.508	0.2%
APS1 at 50% pedal opening	2.68	2.677	0.3%
APS2 at 50% pedal opening	1.36	1.3585	0.15%
APS1 at 100% pedal opening	4.35	4.35	0%
APS2 at 100% pedal opening	2.21	2.209	0.1%

Table 4.1: Result of testing