**Overview**

**1. Project Materiality:**

Aging or visually impaired loved ones wouldn't have to give up their independence. Time spent commuting could be time spent doing what you want to do. Deaths from traffic accidents—over 1.2 million worldwide every year—could be reduced dramatically, especially since 95% of accidents in the Viet Nam involve human error.

**2. Project Purpose:**

Project purpose is applied for using information technology to” Build a self- driving car which is able to avoid obstacles”

**3. Subject and Research area:**

The subject of the project: - Research the theory of SRF- 05 sonar sensor’s distance. - Motor control method (self- moving method). - Research area: car’s work area is a surface to be limited by walls, obstacles and is considered as a complete quiet 2-dimension obstacle.

**4. Scientific research methods**

Using and Combining some methods such as:

* Pulse Width Modulation Methods (PWM)
* Motor reversal method (H-Bridge Circuit)

**5. Scientific and Practical Significance of our project**

**a/ Scientific Significance**

Base on scientific knowledge to build a robot that have ability to avoid the object in the street, which use sonar sensor (SRF05).

**b/ Practical Significance**

Potential Application of seft-driving cars is very huge in the future such as seft driving cars for high-way street, seft-parking, seft-finding direction.

**Chapter 1. Introduction**

**1. Introduction of the project:**

**- Project name:** Building a self- driving car to avoid obstacles which use SRF- 05 sonar sensor to calculate distance and have a remote control.

**- Assistant teacher:** PhD. Self- driving car uses SRF- 05 sonar sensors to calculate distance. Robot’s environment is a surface and limited by walls, human and other cars which are considered as complete quite two dimension obstacles. In this project, Robot has 6SRF-05 sonar sensors, these sensors will be divided into 3 sensors which is located in front of the car and 3 others is located in the back car. In addition, 3 sensors will be located in front of the car, then a sensor will be located in the center of the car and 2 others will be balanced with one. 3 sensors in the back car will be the same with the car’s head. We have to put these sensors like this way because these sensors can detect all obstacles to prevent traffic jams in reality.

**Step 1:** 3 SRF- 05 sonar sensors calculate distances through the left, right and straight. After that, these results will be sent to the microcontroller.

* The theory of SRF- 05 sonar sensor’s distance:
* SRF05 uses the reflecting principle to calculate distance

• When SRF- 05 wants to calculate distance, it will eject 8 frequencies with 40 KHz, and it will wait for the reflecting waves back. Time from ejecting to reflecting waves is easy for calculating the distance between SRF- 05 and obstacles. • When ejecting waves and waiting for the reflecting waves backs, SRF- 05’s Echo will keep up to high level (Echo= 1) and SRF-05’s Echo will keep down to low level or after 30us if the reflecting waves come back or there’s no the reflecting waves back.

**Step 2:**

Microcontroller based on the calculation of SRF- 05 sonar sensor to process (based on 7 possible conditions when sensor detect obstacles, each condition will have a distinct solution) and decided to process to motor 1 or motor 2.

- Interaction between Amega328P and SRF- 05

• The calculation of SRF- 05 is to calculate time when Echo is at high level.

• To calculate time when Echo is at high level, we use Timer 1 and turn off Amega328’s outside.

• When calculating distance, we activate Trigger 1, a frequency is at least 10 ms then it will wait for Echo which is at high level. Activating timer 1 and waiting for Echo which is low level, when Echo goes down to low level to stop timer and calculate values from timer to draw out distance

## **3. What ‘s task need to do?**

Designing and building self-driving cars has sonar sensor to avoid the obstacles in the street.

**4. Project function.**

Self-driving cars have ability to avoid the obstacles by using 6 sonar sensor SRF-05 and 4 color sensor.

**5. Fundamental blocks.**

**- Sources block:** supply input power +5V for system

**- Center controller block:** include 3 small block (Reset block, Initial pulse oscillator block and microcontroller block)

* Reset block: reset the system to its original state
* Initial pulse oscillator block: create clock quartz frequency
* Microcontroller block(Amega328): control the operation of the system, handle the information from the signal of sensor then controls the operation of the engine.

**- Engine controller block (BDESC-Brushed Electronic Speed Controller):** control velocity and reversible dimension of two motor.

**- Sensor block (SRF-05):** identify outside environmental state (obstacles) and then send environmental state to processor-> give responses to control robot to deal with external events.

**- LCD block:** display the results from the sensor (SRF-05)

