Faculty of Engineering, Ain Shams University
Credit Hours Engineering Programs
Mechatronics & Automation Program

CSE211

Introduction to Embedded Systems

Project

Traffic Light Control Systems

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1 Introduction

Traffic light is used all around the world. Traffic lights are very important to control traffic. Normally someone job is to control traffic but why that why we use man power to control traffic light when we can control it using Embedded systems using **ARM cortex M4 TivaC** for example. We designed a traffic light control system to control traffic and make driving easier. To do so we created a situation (system) where we can test our program and prove that it works well.

2 Situation (system)

The situation is we have two traffic lights. One allows cars to move from north to south, and the other one allows cars to move from east to west. We also have pedestrian traffic light one beside each traffic light of the two we have. The pedestrian has to press on a button to have his light green to cross the street safely.

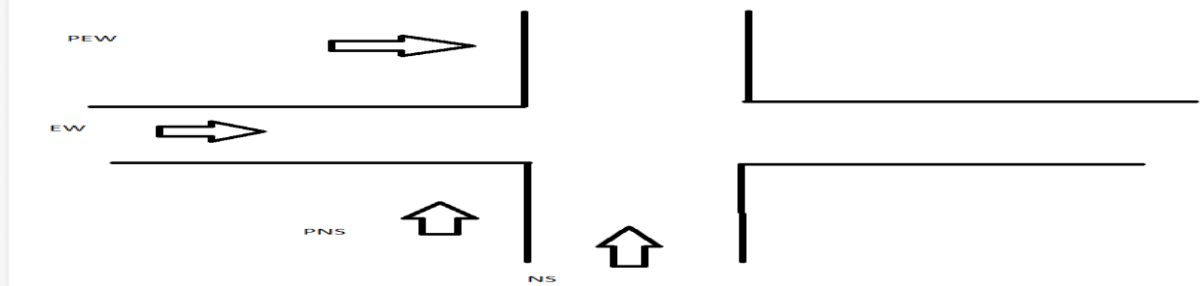

Figure 1 : Situation

3 Embedded system

Using **ARM cortex M4 TivaC** Timers, GPIO, Interrupts and some other features we were able to make our Embedded system.

Using a Timer we have the two traffic light working. Green for 5 seconds, Yellow for 2 seconds and then turns Red when one of the traffic lights set to Red the other one goes Green after exactly 1 second then this sequence is repeated.

For each pedestrian traffic light, we have a push button and 2 LEDs, Green and Red, when the push button is pressed the traffic light that is green will be interrupted and the pedestrian traffic light will be Green for 2 seconds then it will go back to Red and the interrupted traffic light will continue its function.

4 Flow chart

4.1 *system*

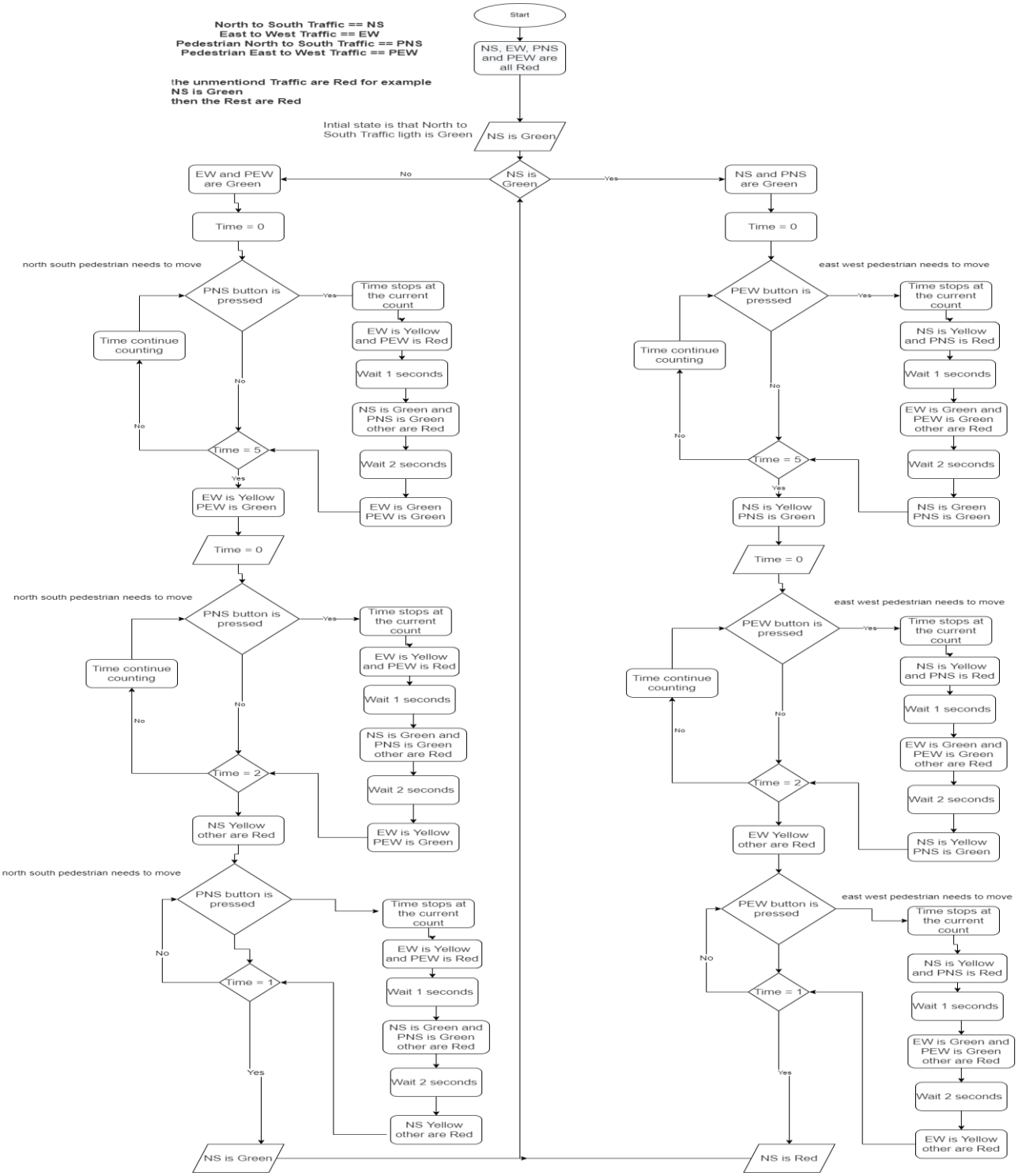

Figure 2 : System Flow chart

4.2 *code*

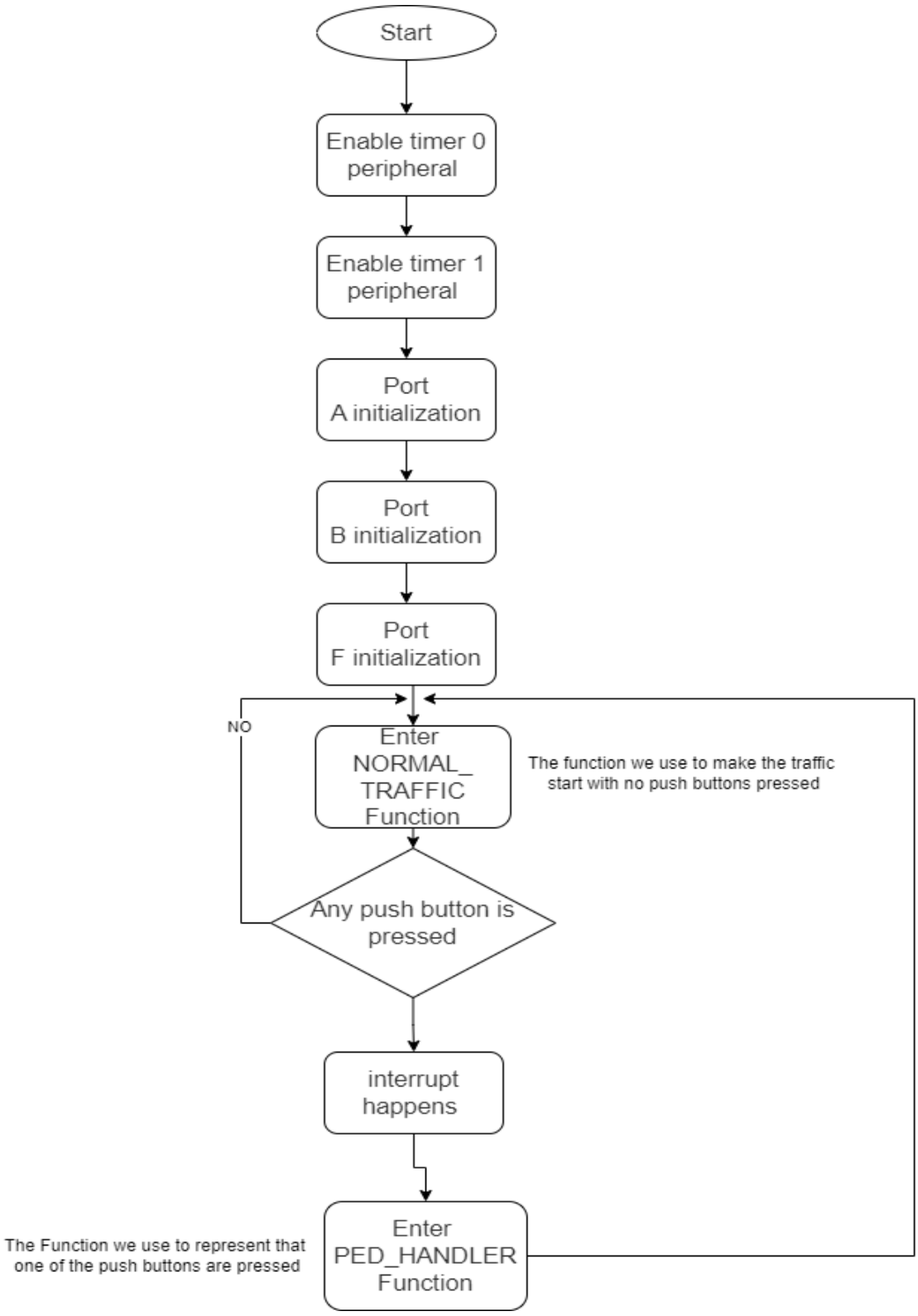

Figure 3 : Code Flow Chart

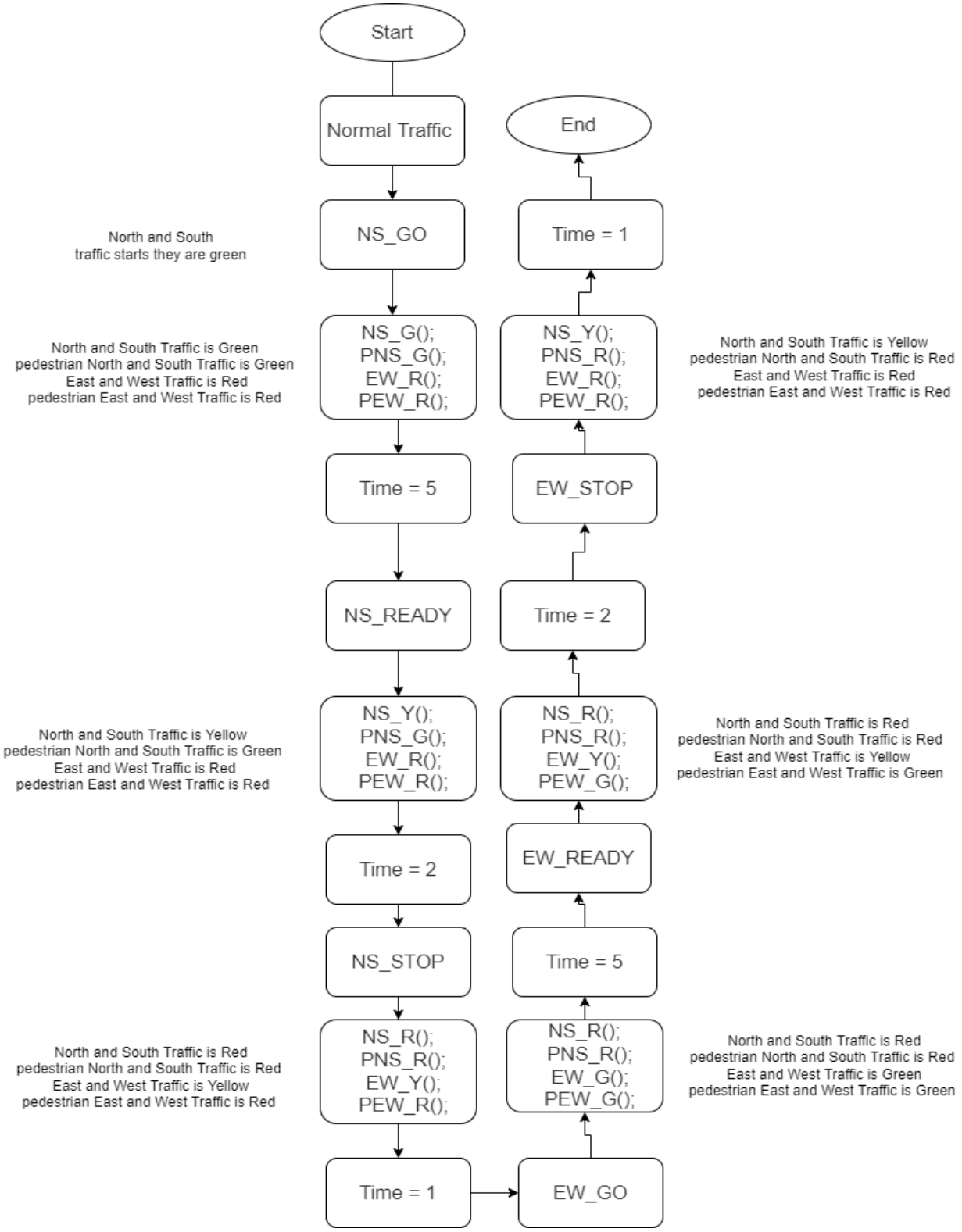

Figure 4 : Normal Traffic Flow chart

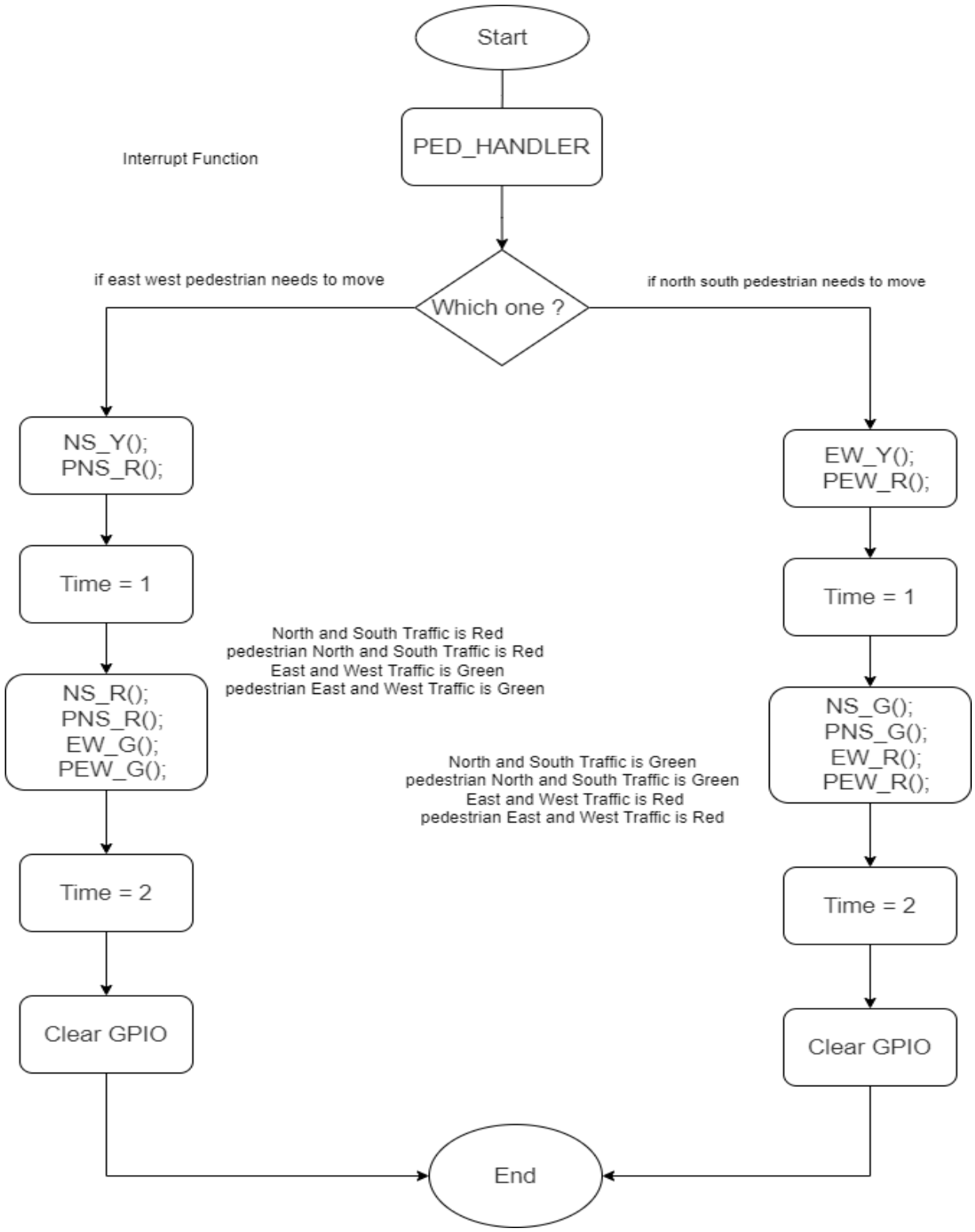

Figure 5 : PED_HANDLER flow chart

5 Function description

NORMAL_TRAFFIC: The Function where Traffic Lights start to work in its normal sequence

NS_GO: North South go

NS_READY: North South ready

NS_STOP: North South stop

EW_GO: East West go

EW_READY: East West ready

EW_STOP: East West stop

NS_G: North South Traffic is Green

PNS_G: Pedestrian North South Traffic is Green

EW_G: East West Traffic is Green

PEW_G: Pedestrian East West Traffic is Green

NS_Y: North South Traffic is Yellow

EW_Y: East West Traffic is Yellow

NS_R: North South Traffic is Red

PNS_R: Pedestrian North South Traffic is Red

EW_R: East West Traffic is Red

PEW_R: Pedestrian East West Traffic is Red

PED_HANDLER: when pedestrian presses button it is the function that contains the interrupt

6 Project link

In this link there is our project files

https://drive.google.com/drive/folders/1svHZATpsoSIbesirKBellSZxOBIxVeF4?usp=sharing

7 Working video link

https://drive.google.com/file/d/1y5Kkm3t8Cw2aBXr8bOeREC5SpJ9UqR92/view?usp=sharing