WIPER CONTROL SYSTEM

ABSTRACT

Over the past two decades, the automotive industry has aggressively researched ways to exploit modern computing and electronic advances in the development of safety, reliability, and entertainment technologies for vehicles. With drivers exposed to an ever increasing number of distractions, automatic rain-sensing wiper systems become an even more appealing feature, as they work to minimize the time the driver must take his/her hands off the wheel.

Most traditional systems offer intermittent as well as variable speed operation. The traditional wiper system however requires driver constant attention in adjusting the wiper speed .Traditional windshield wiper speed constantly varies according to time and vehicle's speed. Because the manual adjustment of the wiper distracts driver's attention, which may be a direct cause accidents.

This module is for automobile(car) for adjust speed of wiper automatically according to the ignition key position at ACC, wiper ON,wiper OFF, ignition key position at lock. The system activates the wiper to operate in full user control mode.

INTRODUCTION:

Wiper is an essential component that used to wipe the raindrops or any water from the windscreen. Wipers are designed and made to clear the water from a windscreen. Most of cars have two wipers on the windscreen, one on the rear window and the other on each headlight. The wiper parts visible from outside the car are the rubber blade, the wiper arm holding the blade, a spring linkage, and parts of the wiper pivots. The wiper itself has about six parts called pressure points or claws that are small arms under the wiper [1]. Figure 1 Basic Wiper Mechanism Diagram [1] Existing system manually used control stalk to activate wiper and the process of pulling up wiper is difficult to be handled. The driver needs to switch on and off the control stalk and it will reduce the driver's concentration during the driving. Thus, this system is proposed to solve all these problems. The concept of this wiper system is similar with other conventional

wiper, yet this system will be upgraded to an automatic control system by using a controller. Whenever the water hit a dedicated sensor that located on windscreen, it will send a signal to move on the wiper motor. Once water is not detected by sensor, the wiper will automatically stop. This will help the driver to give more concentration and reduce the car accident probability. In this project, there were two innovations reviewed as the literature review. The two were designed with different concept and operating mechanism however with same objective of working principle of the car wiper. The rain sensor was a highly versatile device for automatic wiping of vehicle windscreen when it is wet due to moisture, raindrops or even mud [2]. It worked by reflecting harmonious light beams within the windscreen. When raindrops fall onto the windscreen, this harmony light is been disturbed and creating a drop in the light beam intensity. The system then activated the wipers to be operated in full automatic mode. It has a response time at 0.1 seconds. It allowed for a quick reaction when it is a sudden splashes of water that will make the driver totally 'blinds' when the situation happened. With the automatic wiper, the driver can avert from the risk of an accident. The automatic wiper is important during the heavy traffic e.g. in town, city, school zone and other public place. A driver may be subjected to many distractions with bad weather, dangerous road conditions and fatigue. The Rain Sensor reduced the driver's burden by making the driving more comfortable. Trailing a wet car is no longer a nuisance as detection of even 0.005 milliliters of water is possible.

OBJECTIVE:

The main objective of this project is through ARM microcontroller to design a wiper control system. The project mainly insists on controlling the motion of wiper based on frequency and time period (in seconds).

BENEFITS:

• It is used in automatic wind shield wipers.

• In real time, rather than switching automatically, hands free callings is user-friendly.

• It provides high accuracy since it depends on the frequency

• It is very quick to compute the detect the object.

• Safety of the user is ensure while driving and it is convenient to drive in any seasonal changes.

• It has a quick response time(efficiency).

4 W'S AND 1H:

Who?

- With view of sensing the obstacle wiper is control system is being user by all heavy vehicle/automobile user's (like car, truck, train, chopper).It can help people driving vehicles in terrain, roads, hill station and highways.

What?

- 3 LEDS are used in the wiper system.

When?

- It is used when the key ignition is turned ON/OFF where three LED's are turned ON/OFF depending the frequency.

Where?

- IT is used in heavy vehicle/automobile

How?

- IT can be achieved throught the analog to digital convertor, LEDS, timer's and so on.

SWOT ANALYSIS:

STRENGTH:

a) Automatic control of wiper system.

b) Independancy by setting the frequency once, rather than relying on user's instruction.

c) operating principle is very easy

d) Can prevent faults, and can prevent accidents.

e) Easy to construct and cheaper in cost with long durability.

WEAKNESS:

a) May not detect all objects.

b) Can produce false reading at certain occasion.

c) Its has special physical limits (like covers only a certain range).

d) Qute high cost for operations.

e)Timing interval may vary(i.e., start time of wiper)

OPPORTUNITIES:

- Technology maturity can reduce the system cost and help the user to cope with the real time environmental issues. The automobile to monitor if any obstacle is to be detected in the travelling path is to be ensured to avoid any accidents by turning on the wiper.

REQUIREMENTS:

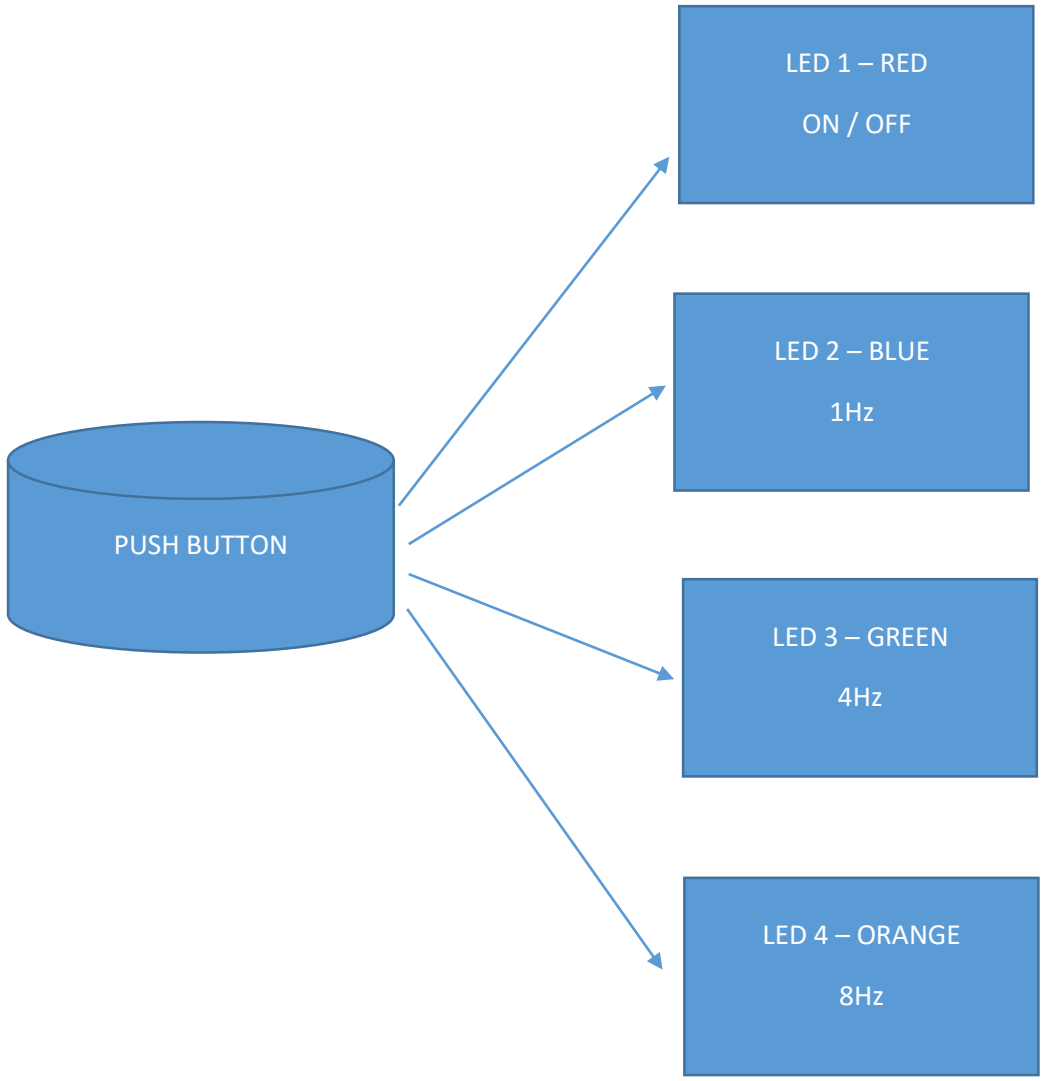
HIGH LEVEL REQUIREMENTS:

S.no	High level requirement	Description	Status
1	HLR1	STM32CubeIDE	Implemented
2	HLR2	Cygwin	Implemented
3	HLR3	Qemu	Implemented
4	HLR4	OS Windows	Implemented
5	HLR5	Hard-Disk	Implemented
6	HLR6	4 GB RAM	Implemented

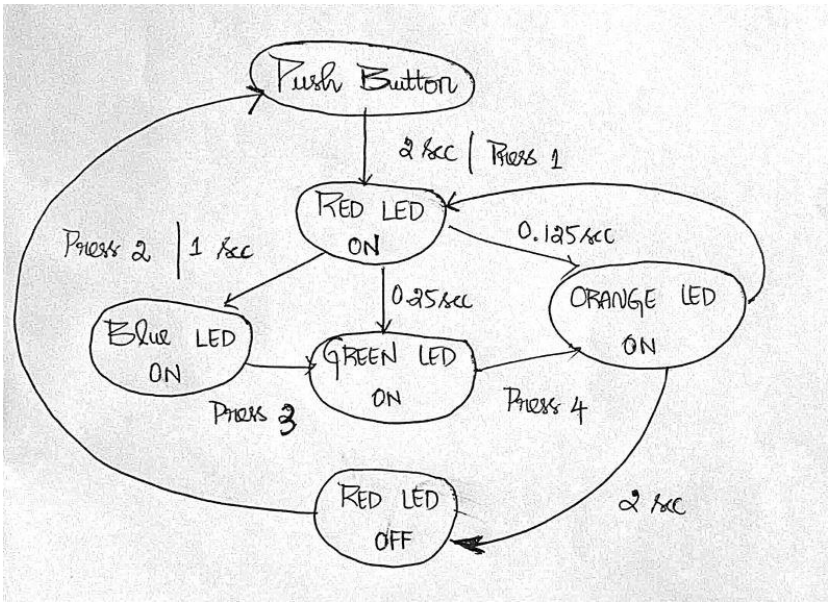
LOW LEVEL REQUIREMENTS:

S.no	Low level requirements	Description	Status
1	LlR1	Red LED ON	Implemented
2	LlR2	Blue LED frequency 1Hz	Implemented
3	LlR3	Green LED frequency 4Hz	Implemented
4	LLR4	Orange LED frequency 8Hz	Implemented
5	LLR5	Red LED OFF	Implemented

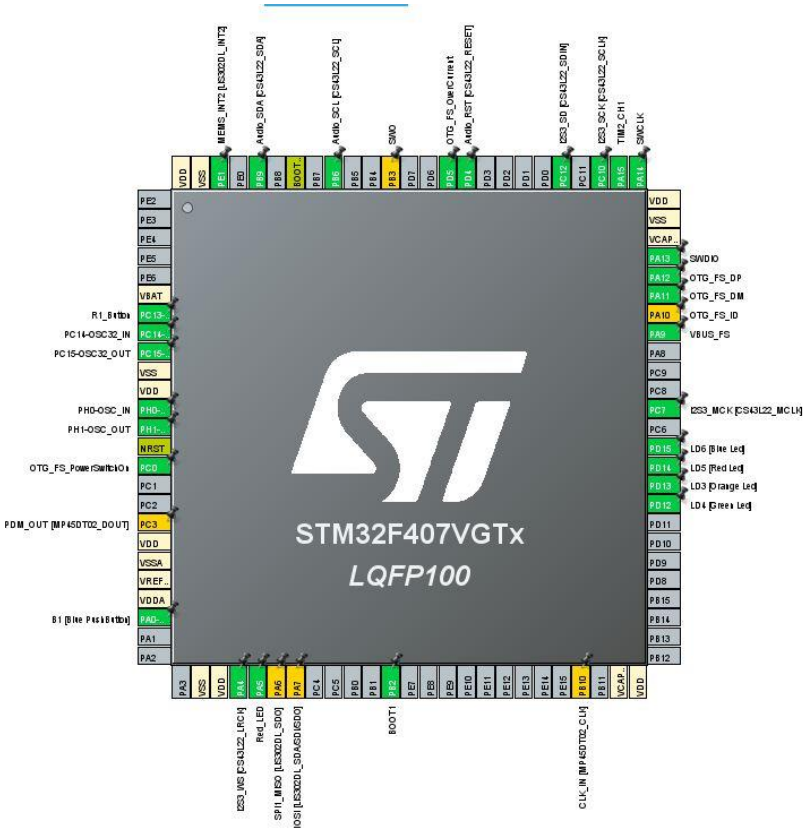
BLOCK DIAGRAM:



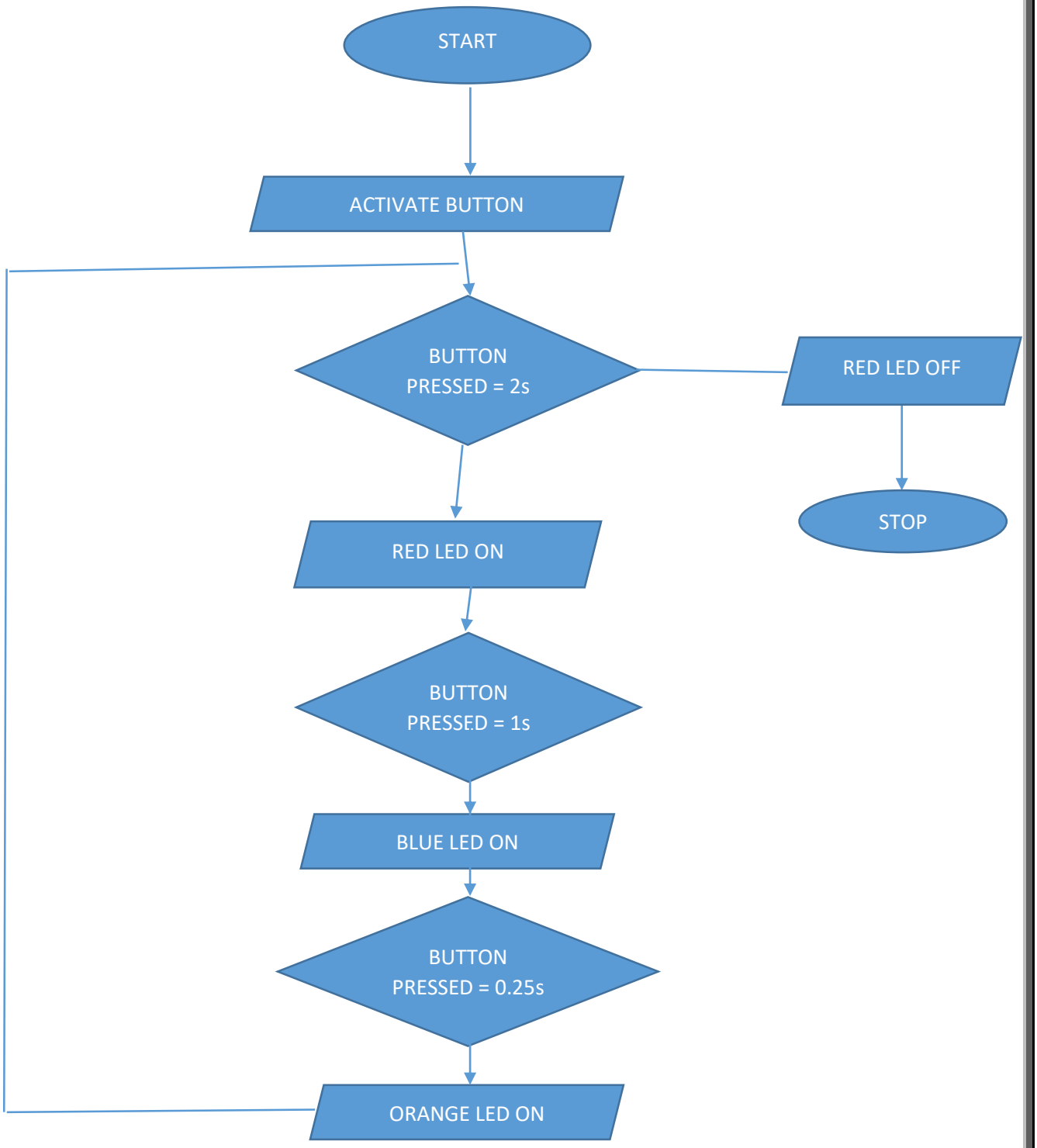
DATA FLOW DIAGRAM:



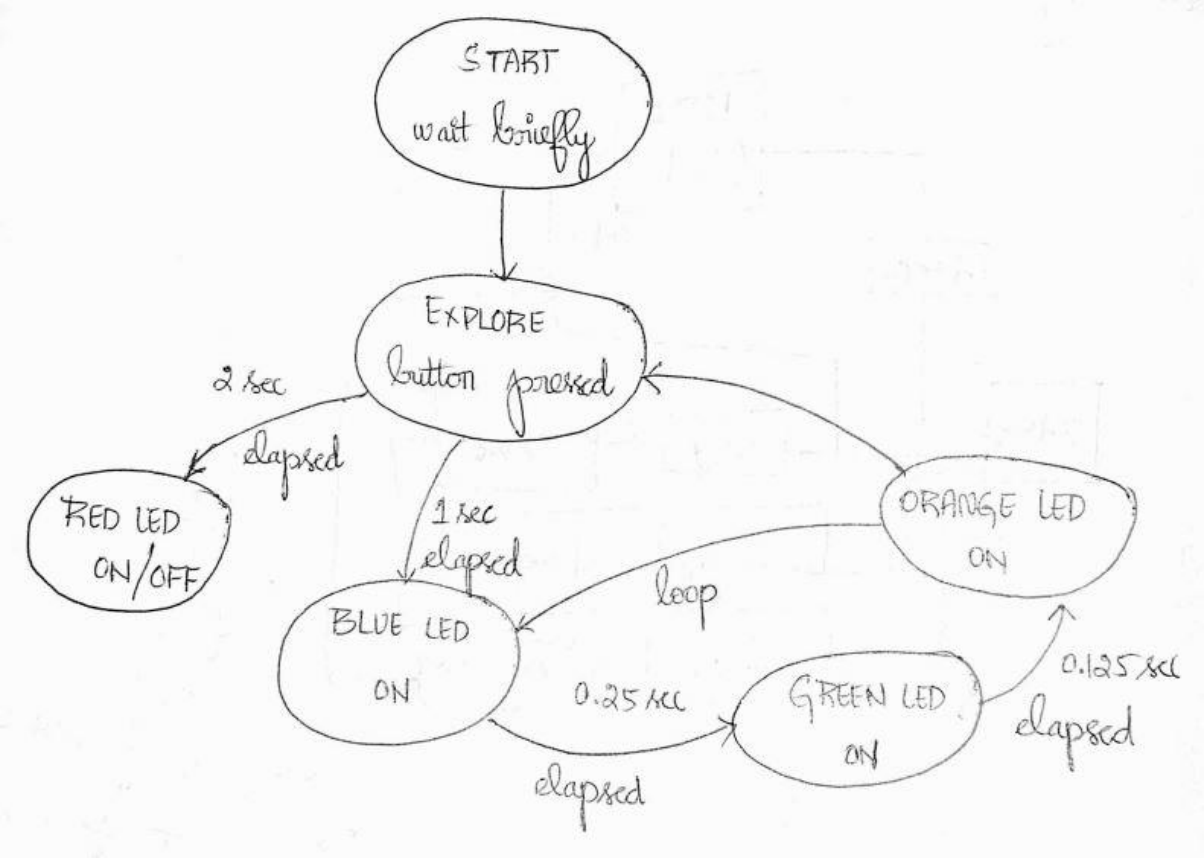
SCHEMATICS:



FLOW CHART:


START
ACTIVATE BUTTON
BUTTON PRESSED = 2s
RED LED OFF
STOP
RED LED ON
BUTTON PRESSED = 1s
BLUE LED ON
BUTTON PRESSED = 0.25s
ORANGE LED ON

STATE TRANSITION DIAGRAM:



REFERENCES:

[1] Wong Sai Hoong & Gilbert Thio "Design of A Moisture Controller For Wiper" Paper reach report JASA |July 2006.

[2] Working system of windshield wiperhttp://auto.howstuffworks.com/wiper.html.

[3] Sonali B. Madankar, Dr. Milind M. Khanapurkar "Intelligent Rain Sensing using Automatic Wiper System" 2nd National Conference on Information and Communication Technology (NCICT) 2011.