WIPER CONTROL SYSTEM

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Introduction

Mary Anderson, patented the first windshield wiper in 1903 andwitnessed the streetcar operator labouring with extremely poor visibility while riding a streetcar in New York City ,he immediately started designing a windshield wiper that the driver might use to aid enhance visibility.This manual mechanism used a lever to control a series of wood and rubber arms that helped clear snow, rain, and debris.

Windshield wipers were not standard equipment on most vehicles until 1916, allowing for further technological developments. In 1919, inventor William M. Folberth developed the first automatic, non-hand-driven windshield wipers.

Until the 1960s, when intermittent wipers became more widespread, this vacuum-powered technology was extensively utilized, thanks to Robert Kearns, an engineering professor whose concept actually took root. When Kearns proposed manufacturing the idea, he brought it to the attention of Ford Motor Company. While this concept contributed to the development of windshield wipers.

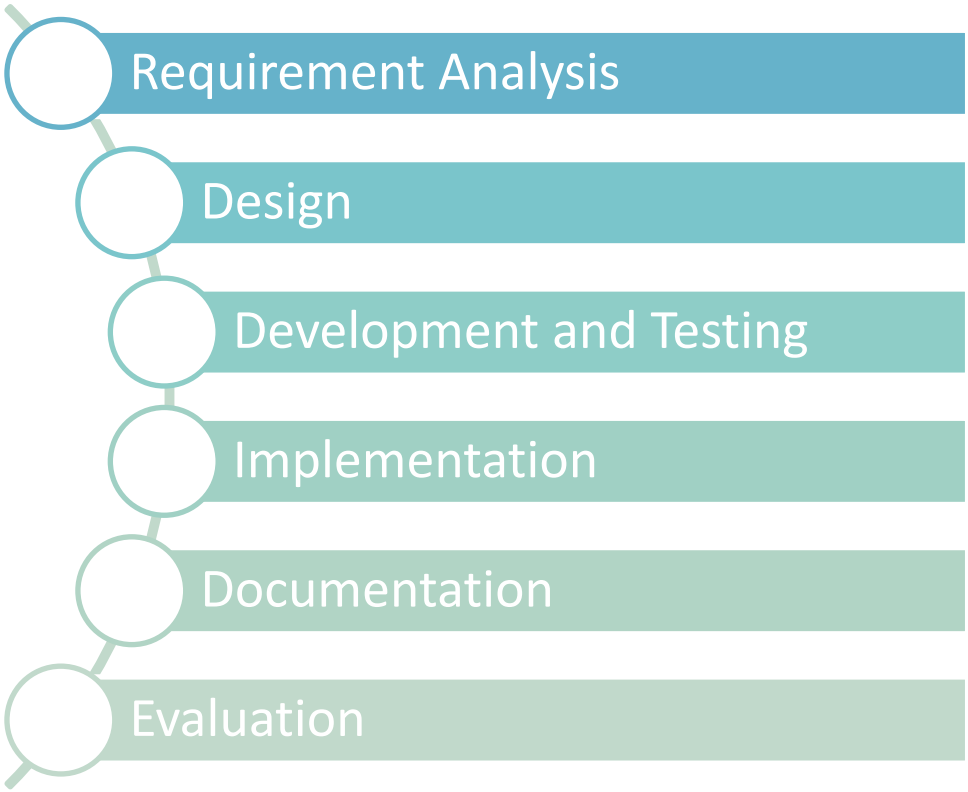
Windshield wipers are now standard equipment on most automobiles, with a number of alternatives available. Rain-sensing wipers that start themselves have even been introduced by the automotive sector. With this technology, the road view will always be clear.

In this project, I'm trying to enact the **WIPER CONTROL SYSTEM** with the help of 4 componets along with their functionalities listed below:

1. **Ignition Key Position at ACC:** The Red LED is ON, if the user button is pressed and held for 2 secs
2. **Wiper ON:** *Wiper is OFF:* On press of the user input, Blue, Green and Orange LEDs come ON one at a time with the set frequency, The frequency changes on every alternate key press, 3 frequency levels with 1, 4 and 8 Hz
3. **Wiper OFF:** *Wiper is ON:* The LED glow pattern stops on the 4th press; the wiper action starts next press onwards as mentioned in step 2
4. **Ignition Key Position at Lock:** The Red LED is OFF, if the user button is pressed and held for 2 secs.

System Development Life Cycle

System development life cycle is the standard process adopted for creating and maintaining an information system. It has got six stages as follows.



For our project, all six stages were performed.

- First, I have studied about the history of the windshield wipers and also the wiper control system followed by top 3 companies named BMW,Maruti,Tata.
- Then distinguished the wiper control system of all 3.
- Developed solution for my problem statement using embedded C language and microcontroller STM32.
- Created test cases using requirements and tested the developed system
- Deployed solution on Git hub
- Performed all the necessary documentation
- Evaluation of solution in the market and gathering feedback to improve it further

Requirement Analysis

This section details the initial requirement analysis findings. We will use 5Ws framework and SWOT analysis technique to assess the business need and requirements.

5Ws and H Framework

- **Who** are we trying to help?
  People to get better technology based wiper system.

- **What** is your Product Vision?
  Vision of our project is to enact the wiper control system with the help of 4 Led's and a push botton. will help the user in obstacle detection. I've tried to implement the motion of wiper at e different speeds with the help of 3 Led's blinking at 3 different frequencies at the press of a push button. 4th Led is dedicated to show the Ignition Key Position at ACC and the same is used to show Ignition Key Position at Lock after the wiper motion at 3 different frequencies.

- **Where** should we start?
  Government organizations are the best places to start with.

- **Why** will we succeed?
  Our products accuracy and effectiveness are the factors which differentiate us from other solutions already existing in the market.

- **When** should we launch?
  The launch should be done immediately as it is necessary to assess public awareness to avoid the helplessness.

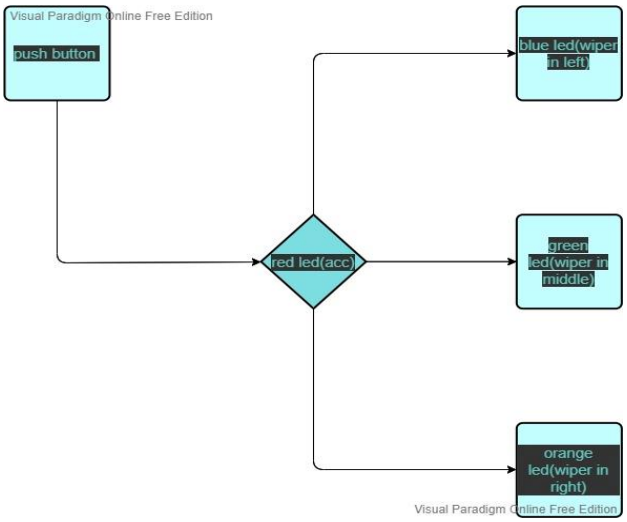
- **How** will we do it?
  We will use embedded C language for the coding part and microcontroller STM32 for designing of the circuit.

SWOT Analysis

- **Strength -** Effective concept and price money will attract users.
- **Weakness –** Due to limitation of board STM32f4, I've to enact the process at a basic level.
- **Opportunity –** Improving the wiper action at a better level.
- **Threats -** If the product works well, it can be implemented by other users, so we need to bring in enhancements frequently to distinguish the product and make it hard to replicate easily.

Diagram

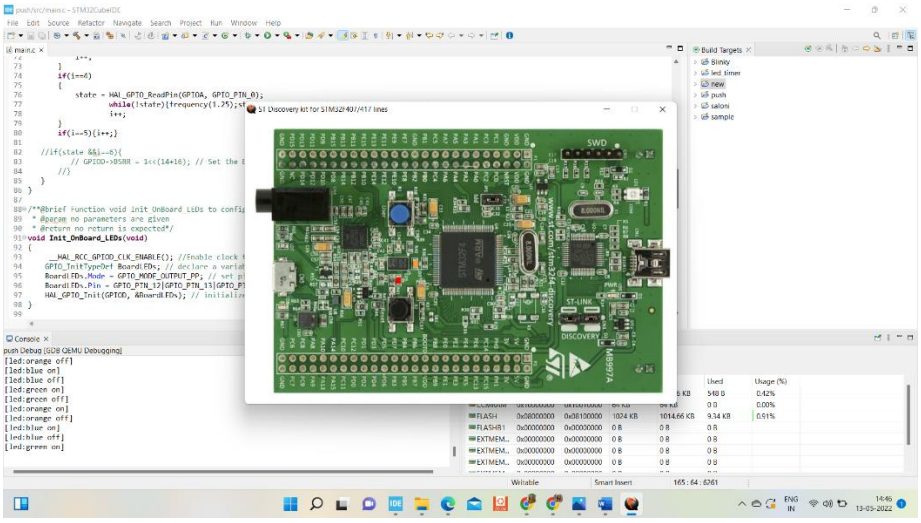
Flowchart Diagram



Requirements/Solution Design

This section details the requirements and solutions created for our system.

S.no	HLR	LLR
1.	Allows the user to depend on our accurate wiper sytem.	Because of some limitation, we have tried to enact wiper using very basic components.
2.	We have tried to inculcate the same wiper motion as the real car does.	We've used 4 Led's and a push button .
3.	Tried to perform the same motion in 3 different speeds .	All the Led's have been configured.
4.	Frequency of Led's corresponding to these 3 speeds are 1,4,8Hz.	The clock is enabled first of all.
5.	Controlling of Led's has been done.	The frequency changes alternatively when the push button is pressed representing the different speeds of wiper.



Test Plan and Results

This section details out test plan and results achieved on testing the software.

TEST CASE #	COMPONENT	TEST CASE	RESULT
1.	RED LED	On when push button is pressed for more than 2 secs.	Pass
2.	BLUE LED	On when push button is pressed once for less than 2 secs after the red led is on with frequency 1Hz,4Hz,8Hz.	Pass
3.	GREEN LED	On when push button is pressed once for less than 2 secs after the red led is on with frequency 1Hz,4Hz,8Hz.	Pass
4.	ORANGE LED	On when push button is pressed once for less than 2 secs after the red led is on with frequency 1Hz,4Hz,8Hz.	Pass
5.	ALL 3 leds	Off after the push buuton has been pressed once again.	Pass
6.	RED LED	Off after pushbutton is pressed for more than 2 secs.	Pass