

Digital Dashboard for Two Wheelers using Microcontroller

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Abstract: The project titled “Digital Dashboard for Two Wheelers Using Microcontroller” is planned to implement with different features by using digital technology. This project meets the today’s trends and technology. In this project the vehicle parameters are displayed digitally on the dashboard for easy monitoring of all the features which makes driver know the status of vehicle parameters.

Keywords: KMPH, LCD, RPM, Microcontroller.

1. INTRODUCTION

This project titled “**Automobile Digital Dashboard for Two Wheelers Using Microcontroller**” has several features. This is a LCD based digital dashboard used in two wheelers for easy monitoring of features by the driver. In automobile industry this digital technology is allows capturing and reporting the data. Microcontroller of R5F10CME_xFB is used as the heart of the system. Different vehicle features such as speed, RPM, fuel, side stand, left, right, Hi beam indicators, Trips, clock, engine temperature, battery status ,low fuel buzzer indication with back light illumination is performed .

Features of Digital Dashboard

Odometer

The odometer is a task to calculate the distance travelled by the vehicle using the vehicle speed and time odometer is displayed on LCD. The odometer counts every kilometer per hour (kmph) covered by the vehicle.

Speedometer

The speedometer is a task to capture and calculate the speed of the vehicle through a digital speed is displayed on LCD screen. The unit is kmph. The speed is calculated using the frequency of the pulses, input from the sensor dedicated for speed input.

Tachometer

The tachometer is a task to capture and calculate the rate of rotation of the engine's crankshaft through a digital sensor. The rpm displayed is the multiple of 1000 that is, in thousand rotations per minute. The rpm is calculated using the frequency of the pulses, input from the sensor

Fuel Gauge

The fuel gauge is displayed on the LCD. It measures analog sensor output and converts it to a particular level in the fuel meter. The fuel display starts blinking if fuel goes below the critical level defined in the application.

Trip meter

There are two trip meters called trip A and trip B keeps the distance count every 100 m (0.1 km). The vehicle driver uses trip meters to see the distance between source and destination; the driver may reset the trips to zero at source.

Side stand indicator

Side stand is the warning for side-stand pulled out that may obstruct the driving; indication is displayed on the LCD segment.

Battery indicator

Battery indicator measures the voltage level of the analog output from the battery and displayed on LCD segment

Temperature

Engine hot/cold indication is used as a warning to the driver for indicating engine temperature too cool or too hot to be started.

Real time Clock

The real-time clock feature is provided on the LCD display. Each time the vehicle starts, the clock needs to be set by the vehicle driver.

Indicators (Left, Right & Hi-Beam)

Left, right turn indicators are provided for signaling the left and right turn of the vehicle to other vehicles. Also a buzzer is associated with these signals for sound indication.

Low fuel level indicator:

To know the fuel level in the tank a buzzer is used if the level of fuel in the tank is reduced to minimum level.

All these features are displayed digitally on the specially designed LCD.

2. PROJECT PROCESS FLOW DIAGRAM

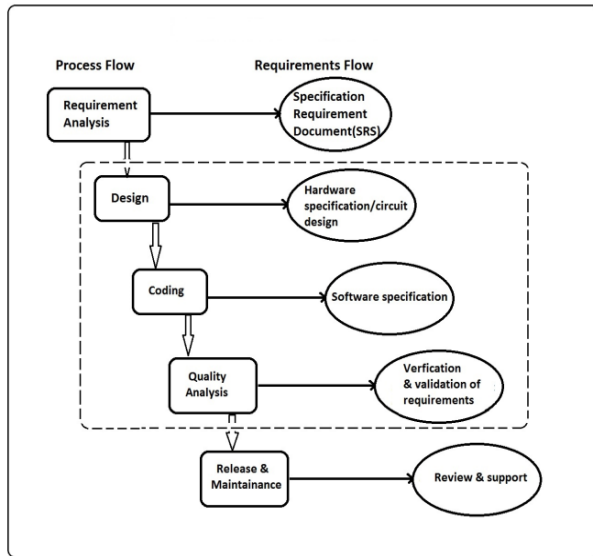


Figure 1. Process Flow Diagram

3. PROJECT PROCESS FLOW STATUS

As shown in the figure it is a process followed to perform this project.

In each and every phase the task is performed and corresponding data is collected and verified and validated.

Requirement Analysis:

The process flow consists of different stages which involves Requirement analysis where the project requirements are gathered and the required documents are done according to the specifications in the documents.

The related project specifications are collected analysed whether the project can meet the present trends and satisfy the requirements. Generally the requirements are gathered according to the requirements of the client.

Business analyst generally analyse the requirements, company's ability to meet the dead lines and to release the project in specified time and cost.

These analysis of required manpower, cost, time are prioritised by the Business analyst.

The document that containing all the specified data is called as Specification requirement document as this contains specifications of the project which will be reviewed by all the persons involved in the project to meet the project specifications.

An analysis is made to meet the project requirements such as utilities of the project whether the time to release the dead lines can be met with the availability of the

company's manpower, cost of the project. Initial Inquiry, Quoting & Estimates, Signing On & Scheduling, Design Phase, Development Phase, Completion & Launch.

4. BLOCK DIAGRAM OF DASHBOARD

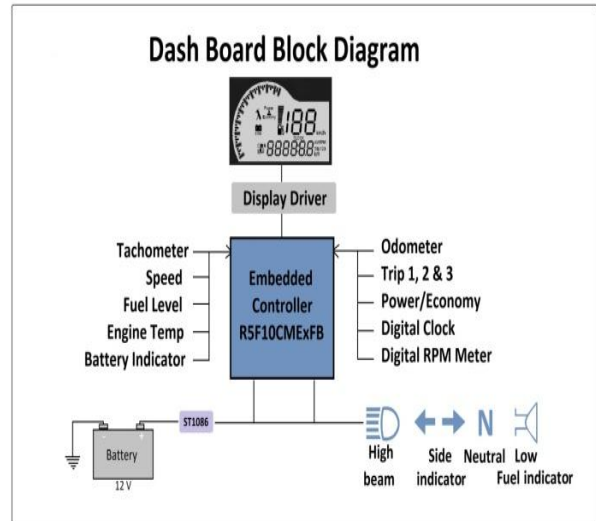


Figure 2. Block Diagram of Dashboard

4.1 Description of Block diagram

Embedded Controller:

It's the heart of the project which performs all the features of the project. This is specifically designed for the automobile industry and is auto grade which has more life span than that of general microcontrollers.

It is ASIC application specific integrated chip. It is 80 pin, 16 bit controller having on chip watch dog timer, instruction speed of 30.25µsec, power on reset, a CAN controller, power supply of 2.7 to 5.5 v, in built timers, on chip debug function.

This controller takes the input parameters and output is displayed digitally on the LCD shown in the diagram.

Battery:

Battery gives 12v supply to the system and the voltage regulator regulates till 5v where the system requires.

The indicators are displayed for left, right, Hi beam, low fuel level buzzer its symbols are displayed

Display Drivers:

Display drivers help to burn the software on the chip. An emulator acts as a device to burn the software on the chip. This process is called as porting.

Display:

All the features are displayed on the LCD digitally as shown in the figure.

Design Flow:

The design flow requires a good understanding of user needs. There are several phases and processes in the user interface design, some of which are more demanded upon than others, depending on the project

Functionality requirements gathering – assembling a list of the functionality required by the system to accomplish the goals of the project and the potential needs of the users.

User analysis – analysis of the potential users of the system either through discussion with people who work with the users and/or the potential users themselves.

Coding:

Coding conventions are a set of guidelines for a specific programming language that recommend programming style, practices and methods for each aspect of a piece program written in this language.

These are guidelines for software structural quality. Software programmers are highly recommended to follow these guidelines to help improve the readability of their source code and make software maintenance easier.

Coding conventions are only applicable to the human maintainers and peer reviewers of a software project.

As a result, not following some or all of the rules has no impact on the executable programs created from the source code. These documents contain software requirement specifications the type of language used in the project.

Quality Analysis:

A process facilitated by software, reporting and analysis tools that can collect information and determine by defined measures, rules and agreements the quality provided to an end user.

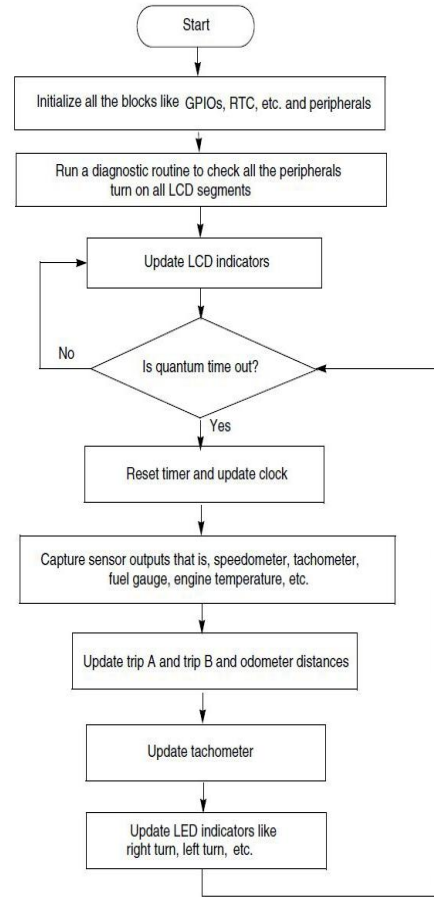
Verification and validation (V&V) is the process of checking that a software system meets specifications and that it fulfills its intended purpose.

It may also be referred to as software quality control. It is normally the responsibility of software testers as part of the software development lifecycle.

- Validation: The process of evaluating software during or at the end of the development process to determine whether it satisfies specified requirements.
- Verification: The process of evaluating software to determine whether the products of a given development phase satisfy the conditions imposed at the start of that phase.

5. SYSTEM LEVEL FLOW CHART

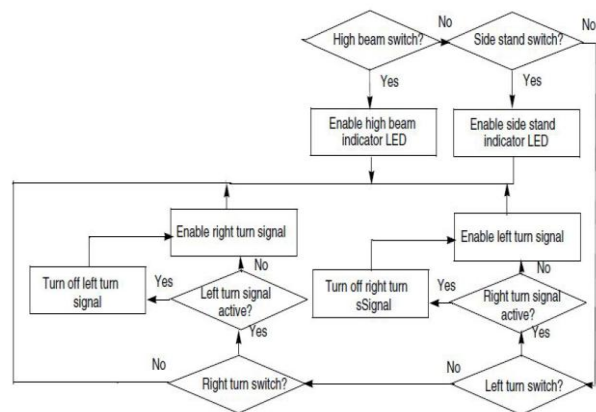
Embedded Software Description



System Level Main Loop Flow

Figure 3 System level flow chart

5.1 Control Switches Flow Chart



Control Switches Press Flow

Figure 4 Control Switches Flow

6. EXPECTED OUTPUT

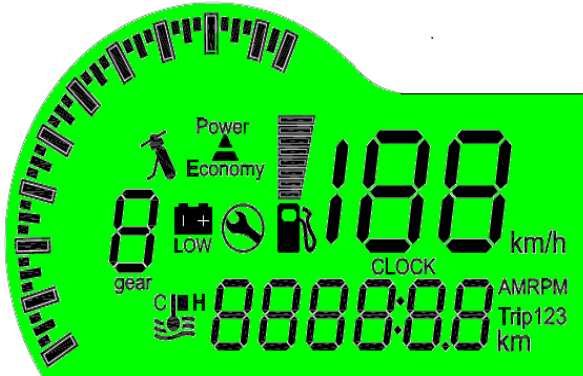


Figure 5 Digital Display Output of Project

7. CONCLUSION

My hypothesis was that, Digital Dash Board with these features would last the longest in all of the devices in the market. My survey and innovation do support my hypothesis to compete the today's trends and technologies. Therefore, I took the measurements to perform and come out of the project. My work involved designing of the project, hardware, coding and Quality analysis to bring out the Digital dash board with enhanced features.

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