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DASHBOARD FORTHE VISUALLY IMPAIRED PEOPLE

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ABSTRACT

This paper proposes a framework of analytical work for modeling of dashboard for the visually impaired people car. The framework incorporates various decision-making techniques and designing of dashboard. The dashboard introduced here displays the speed, indication for each turning i.e. left or right and the battery level as DC motor is used instead of engine and ultimately the output is made audible. The coding for the interfacing different sensors with microcontroller is done by AVR Studio 4, Schematic diagram and simulation is done by using "Proteus7 Professional" software .The proposed design of dashboard encourages the use of visually impaired people car.

KEYWORDS: Visually Impaired, Dashboard, AVR Studio 4,Proteus7 Proffesional

INTRODUCTION

Driving safely and confidently without any human assistance is a difficult task for blind people [1]. The dashboard is an important element of the driving safety system since it shows the driver the status of the car and becomes more important when the person driving is blind [2]. This paper introduces an actively designed dashboard which provides the visually impaired driver information regarding speed limit, indicators whether to move left or right and the battery level indication. The approach here is to have a integrated dashboard having microcontroller which is connected to the different inputs like speed sensor, indicators, battery level sensor and keypad. One of the output coming from the, microcontroller in the text format is converted to speech format and heard by the speaker, and another output is connected to the LCD screen which displays all the different requirements. The speed sensor accurately and instantaneously calculates speed independent of position or acceleration [3-5]. The battery sensor gradually provides the battery status with time. Battery status displayed by battery sensor as High, Medium or Low on the LCD[6-8]. The indicator blinks with left or right movement. The interrupt Coding provides the indicator display on dashboard [9]. The Keypad, LCD, indicator sensor, speed sensor and battery sensor are interfaced with microcontroller[10-12].The text form output is converted to voice by Text To Voice module and listen by speaker which optimizes the dashboard for visually impaired people.[12-13].

PRACTICAL IMPLEMENTATION OF DASHBOARD

BLOCK DIAGRAM OF DASHBOARD DESIGN

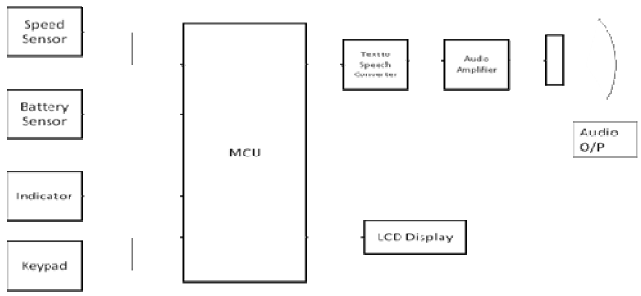

Fig (2.1): **Block Diagram For A dashboard For Visually Impaired People Car**

2.1.1 Speed Sensor

It is a sensor that measures and displays the instantaneous speed of a vehicle. Vehicle speed sensor is located between the axle and wheel. As the wheel rotates the sensor measures the position of evenly spaced spokes. The car for blind people also requires a dashboard giving not only, the speed change at every certain interval of time but also giving that audibly. A combination of optocoupler, diodes and resistors to form a speedometer which is interfaced with microcontroller used as shown in fig(2.1.1). We can directly get that from measuring the ‘rpm’ of the DC motor used.

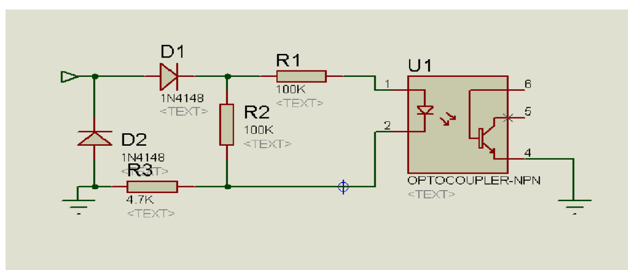

Fig (2.1.1) :speed sensor

BATTERY LEVEL INDICATOR OR BATTERY SENSOR

In the car, dc motor is used so the battery status is matter of concern. The state of charge gives how full the battery is measured in % and deep discharge is how discharged the battery is in %. The battery is displayed as high, medium or low by a combination of comparators and resistors as shown in fig(2.1.2). The comparator compares with the reference value to give the state of battery as high, medium or low.

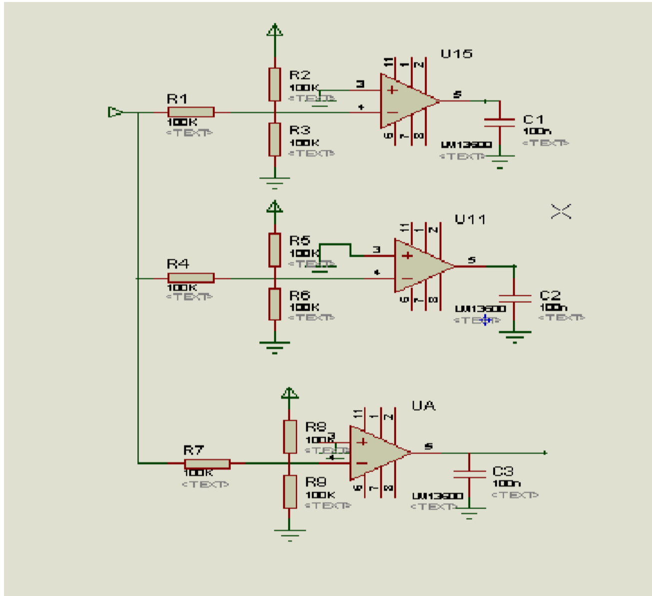

Fig (2.1.2): Battery sensor

INDICATORS

It is required to show the indication on the car when it is turning. Here, combination of optocouplers, diodes and resistors to form indicators are used, showing the movement of car either to the left or right as shown in fig(2.1.3).. We have used interrupt interfacing to get this on the lcd provided.

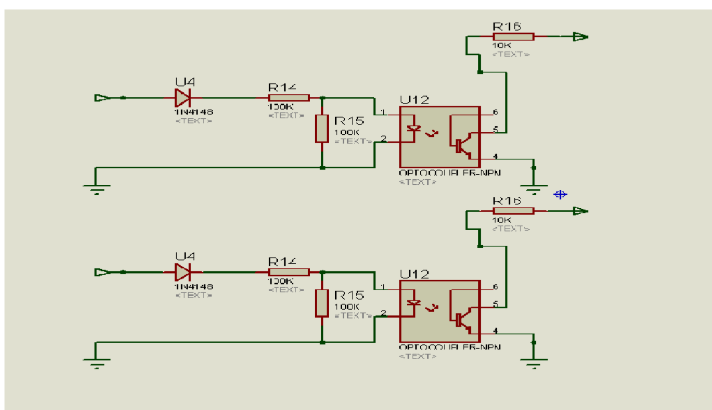

Fig (2.1.3) : Indicators

KEYPAD

A 4 rows and 3 columns keypad is used to operate different functions by the blind person to get information audibly from the dashboard of the car. This keypad is compatible with lcd and C. This is interfaced with the microcontroller and its function displayed by the LCD.

MICROCONTROLLER

The microcontroller used here is Atmel ATmega 32. It is a low power CMOS 8 bit Microcontroller based on AVR enhanced RISC architecture. By executing powerful instructions in a single clock cycle, the ATmega32 achieves throughputs approaching 1 MIPS per MHz allowing us to optimize power consumption verses processing speed. All the 32 registers are directly connected to ALU. this architecture is more code efficient achieving throughputs up to 10 times faster than conditional CISC.

The Atmel AVR ATmega32 is manufactured using Atmel's high density non volatile memory technology and is a powerful microcontroller that provides a highly flexible and cost effective solution to many embedded control applications.

LCD DISPLAY

To optimize the use of this car. The dashboard should have a quality to display all the different requirements of the car, For this we use a 16*4 LCD display further interfaced with the microcontroller used. we have interfaced this with the microcontroller to display our all the requirements like indicators, speedometer and battery status.

TEXT TO SPEECH CONVERTER

As our aim is to make car which blind people can drive. So, dashboard is giving all the information to the blind person audibly. This is done by using a text to speech converter. Here, we have used IC WTS 701 as text to speech converter module. As, the audio coming from the converter is of very small signal which is converted in high audio signal using amplifier LM 386. Then the signal is heard using 8E SPEAKER.

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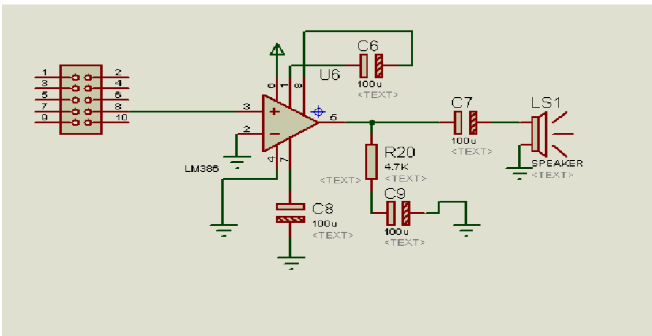
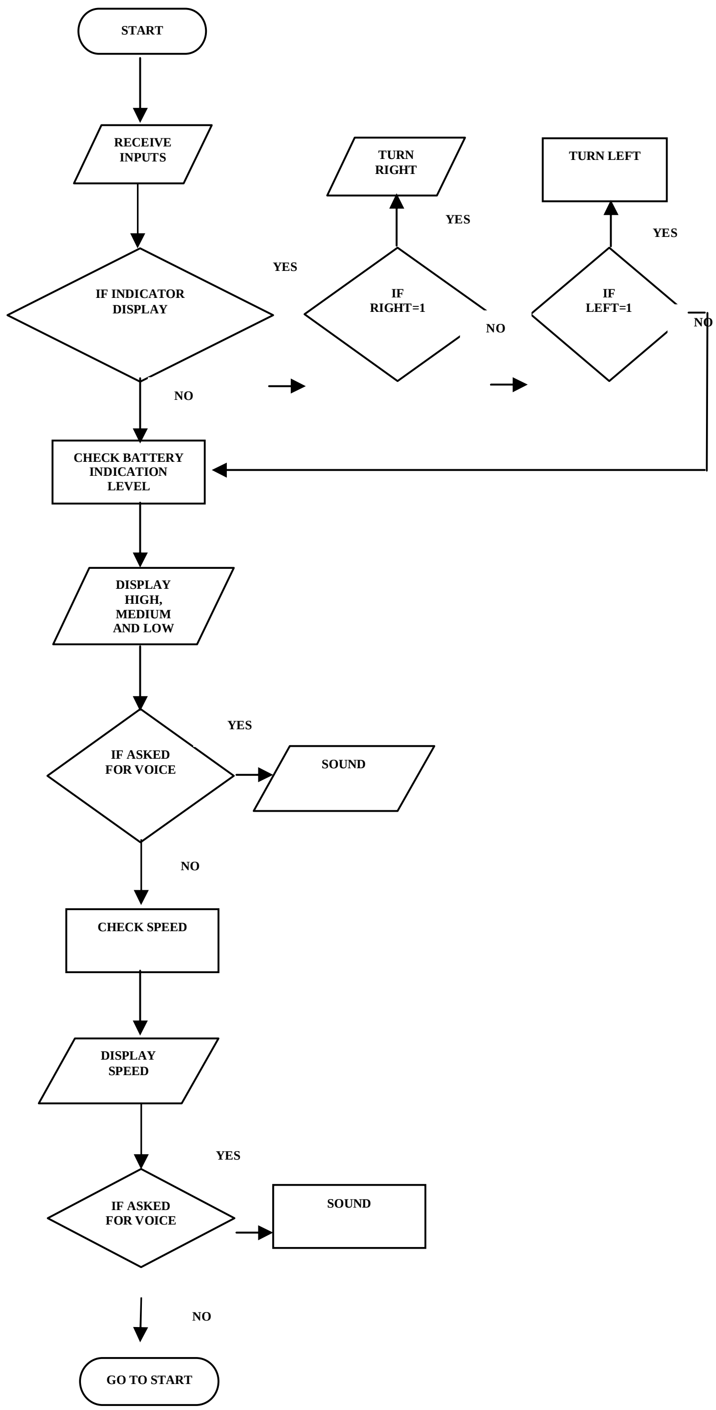


Fig (2.1.4) : Voice to text module

FLOW CHART OF THE DASHBOARD DESIGN

The dashboard design proposed here works according to the flow chart given in fig(2.2). The system receives all the signals from different sensors then decides which indicator to blink then decides whether to give output audibly or not. Similarly it works for battery level indication and speed display.

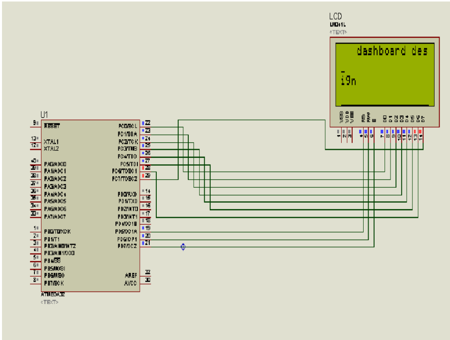


Fig(2.2) : Flowchart for Dashboard Design

SCHEMATIC DIAGRAM

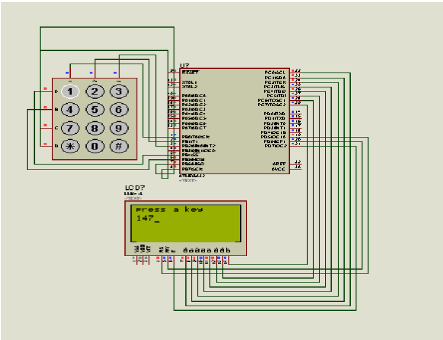
For the making of proposed design of dashboard, interfacing of different sensors with microcontroller is required which is given below :

INTERFACING OF 16*4 LCD WITH ATMEGA32 MICROCONTROLLER



Fig(3.1) : Lcd Interfacing

INTERFACING OF KEYPAD WITH ATMEGA32 MICROCONTROLLER



Fig(3.2) :Interfacing of Keypad

OVERALL SCHEMATIC DIAGRAM

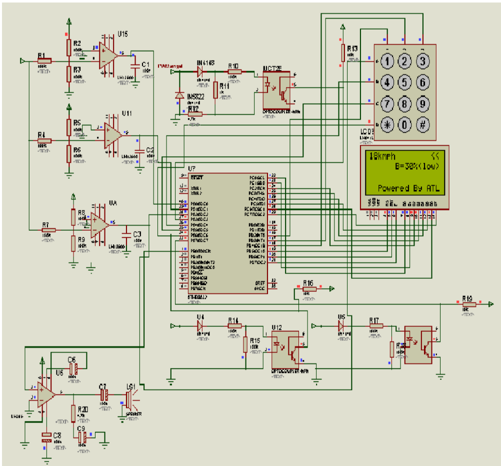


Fig (3.3): Overall schematic Diagram of Dashboard Design

Refer to fig (3.3), overall schematic diagram gives the proposed dashboard design. A 16*4 LCD is interfaced and a 4*3 Keypad is interfaced with the microcontroller. Here, >> and << are used for indicators. An interrupt Program for indicators and an ADC program for battery status is dumped. Then one of the output in the text form coming out from the microcontroller is converted in voice by WTS 701and another is connected to LCD which displays the speed and battery status as well.

RESULTS & DISCUSSIONS

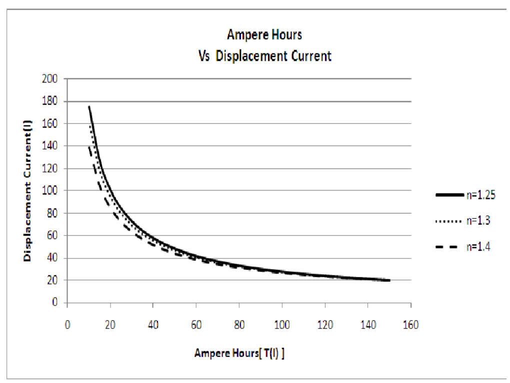
Amperes hours Vs Displacement Current: According to peukart's effect status can also be done by measuring the current drawn out of them. The capacity of a battery decreases increase. Generally 150A-hr at a 20 hour discharge rate. This means 7.5 amp for 20 hours. The general formula[14] is

$$T(I) = \frac{R}{\left(\frac{I.R}{C}\right)^n} \qquad (1)$$

Where,

T is the time the battery will last at the discharge rate I, C is the Amp hour capacity, R is the hour of discharge at the ampere hour rate, n is the peukart's coefficient ranges from 1.2 to 1.4.

A graphical plot between Ampere hour and Displacement current is shown in fig for the three values of n i.e. 1.25, 1.3 and 1.4 respectively.



Fig(4.1): Ampere Hours Vs Displacement Current

Battery Vs Distance that can be Travelled: To know how much distance can be travelled with the remaining battery the concept of deep charge and full charge is applied and theoretically it is found that for 100% battery status car can move 30km and practically it can move 27.5km.With the use of microcontroller we can display this on dashboard. A plot between battery status and distance that can be travelled is shown in fig(4.2).

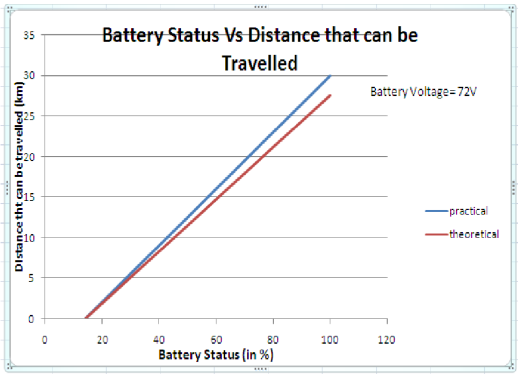


fig (4.2): Battery Status Vs Distance that can be Travelled

CONCLUSIONS

The Paper involves the modeling and designing of dashboard for visually impaired people car. Using this kind of dashboard provides an audible output and simultaneously a visual output using the microcontroller. Three input sensor; speed sensor, battery level sensor and indicator sensor are interfaced with microcontroller and displayed with the help of LCD. The algorithm used, presents an optimal way of dashboard design and can easily be modified as per the modification in circuitry. In addition, this design can be incorporated with any existing vehicle so that visually impaired people can be encouraged for driving. More future enhancement that can be done is showing the GPS, temperature of motor, seat belt sensor, distance sensor etc. on the dashboard and getting them audibly as well which will be very useful for visually impaired people. It is also found that the battery status affects the distance that can be travelled and peukart’s effect can also be used to determine the battery status.

ACKNOWLEDGEMENTS

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