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The Managing of Interior and Ventilation of the Vehicle

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Abstract:

In order to mitigate overheated interior of a vehicle parked in the hot summer sun and thereby to make the entering into the vehicle more comfortable, microcontroller managed module for automatic ventilation of vehicle interior is made. The module is implemented using a microcontroller as a central logical unit and a series of sensors which provide sufficient data to ensure functional, but also efficient, reliable and safe ventilation. The ventilation process is performed by opening vehicle windows slightly, which enables air to circulate Microcontroller controls the position of the windows autonomously and independently of the driver's presence, following predefined algorithm that uses sensors data obtained from the vehicle's surroundings.

Besides temperature, the most important factors to ensure quality implementation of ventilation are detected movements around the vehicle, the presence of precipitation and other. This paper shows the components, their purpose and capabilities, advantages and disadvantages, as well as potential implementations and upgrades. The test results give insight into utilization options of this module and its usefulness. This project uses regulated 5V, 500mA power supply. 7805 three terminal voltage regulator is used for voltage regulation. Bridge type full wave rectifier is used to rectify the ac output of secondary of 230/12V step down transformer.

Introduction:

The ventilation is very important to the humans in anywhere. Especially for vehicle, in vehicles there is a lot of heat generate inside the vehicle, if it is parked in the sun shine results more and more heat. So we cannot enter in to the vehicle immediately, it takes more time to cool inside the vehicle results uncomfortable to the vehicle owner. So that a micro controller managed automatic ventilation systems will help to make the vehicle comfortable to the owners while it is parked in the sun shine of the vehicles. Micro controller managed automatic ventilation system is implemented using a microcontroller as a central logical unit and a series of sensors which provide sufficient data to ensure functional, but also efficient, reliable and safe ventilation. The ventilation process is performed by opening vehicle windows slightly, which enables air to circulate.

Closed area without air circulation and directly exposed to sunlight heats up much faster and reaches significantly higher temperatures than the open space where air circulates freely – so-called "greenhouse effect". That is exactly what happens in a vehicle parked in the hot summer sun, which later represents a problem when Entering such overheated vehicle. The basic idea of this project is to prevent or at least mitigate overheating of the vehicle interior in order to facilitate entering into the vehicle. The problem can be solved by leaving the vehicle windows partially opened so air can circulate, which reduces the heating of the vehicle interior. However, as the ventilation process takes place in a parked vehicle, without human presence, and the vehicle is exposed to external influences, such as precipitation or potential burglary, it is unreliable and unsafe. Consequently, it is necessary to automate the ventilation process. The complete automatic ventilation process is managed by

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microcontroller default algorithm, considering input signals read using various sensors. The temperature sensor measures the temperature inside the vehicle. If it exceeds predefined level of "comfortable temperature", microcontroller automatically lowers the power windows to enable air circulation which alleviates aforementioned "greenhouse effect". The automatic ventilation process must be reliable and not affect the safety of the vehicle. For this reason, additional sensors are used, whose task is to annul dangers appeared with this ventilation method. Before all, these are precipitation sensor that makes the ventilation process reliable, and motion sensors that make it safe.

There are also other sensors whose implementation gives additional quality, but these are the most important of them. Together with temperature sensor, they meet the minimum requirements to perform automatic function of ventilation, without endangering the vehicle. Following chapters show components and technologies used, operation modes, advantages and disadvantages, capabilities and potential upgrades of the module, as well as ability of integration with existing automatic systems within the vehicle. Results of testing the module in real conditions are presented and analyzed.

PROJECT AIM:

The main aim of this project is to prevent or at least mitigate overheating of the vehicle interior in order to facilitate entering into the vehicle.

AUTOMATIC VENTILATION OF VEHICLE SYSTEMS:

The existing system monitors [1] the health condition of vehicle in different environmental conditions. The system also provided to avoid accidents due to the negligence of driver. The system provided with different sensors such as temperature sensor, precipitation sensor, light sensor, security sensor. The predefined algorithm uses the sensors data obtained from vehicle surroundings in different environmental conditions and performs the necessary action to maintain the condition of vehicle which ensures more comfort to the driver. The system uses a camera and MATLAB which is [2] embedded with the system. It allows monitoring the position of driver face. A serial communication is established between the system and PC. If drowsiness occurs by driver, the head of the driver fall to other side of camera frame size. If microcontroller identifies no face with-in the frame size, then the vehicle get stopped or an alertness given by buzzer. The existing system is not powerful enough to provide comfort to the driver in different environmental conditions. The system is provided with proper door locking system, car engine heat [3] monitor system. This provides the monitoring of a single health condition of vehicle. The proposed system is provided with monitoring and controlling of health system of vehicle in different environmental conditions. The system is provided with sensors such as temperature, precipitation, light and security. These sensors monitor vehicle surroundings and interior and controls as per the changes in environment. It is also provided to avoid the accidents due to the drowsiness of the driver.

The previous system is designed to make more comfortable, safe and secure travelling. Hence the vehicle has to make modifications with sensors which are monitor and control by the central core system such as microcontroller. The PIC microcontroller such as 16F877A. It has wide range of features such as 8KB Flash ROM, 368 bytes of on chip RAM, 256 bytes of EEPROM, 1 serial port. The sensors such as [3][4] LM35 (Temperature sensor), PIR Fig.2.1 Block Diagram (Security sensor), LDR (Light sensor), Precipitation sensors are used to make more comfortable of the interior of the vehicle. The system is also facilitated with the safety of the driver or vehicle. Due to the long drive, the driver may get drowsiness and it leads to accidents. When an alarm or body vibration is given to driver whenever he feels drowsiness. Due to drowsiness, the position of head changes. This factor is considered and captured through a webcam. The cam is interfaced to MATLAB through serial communication. The MATLAB system processes the image and authenticate.

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When the vehicle driver head is with the camera frame, the MATLAB found the face and authenticate to start the vehicle. If the head falls out of the camera frame due to the drowsiness, the MATLAB process and does not authenticate the vehicle and the vehicle get stopped or buzzer gives alarm. The camera is interfaced with serial port of the microcontroller. The 25th and 26th pins (RC6 and RC7) act as serial port. Here Asynchronous serial communication is established between camera and microcontroller. When face found in cam frame, an active high signal is sent. It has 10 bit frame rate which includes start and stop bit along with 8 data bits. If face is not found, an active low signal is given to microcontroller. When active high signal is given to microcontroller, the vehicle engine get starts and when active low signal is given to microcontroller, the vehicle engine get stop.

PROJECT OBJECTIVE:

The objective of this project is to implement a low cost, reliable and not affect the safety of vehicle. the system used in vehicles, public transportation etc. and using a microcontroller to achieve hardware simplicity. Microcontroller managed module for automatic Ventilation of vehicle interior system is equipped with the advanced RISC micro controller to enable the all the features, and to make the system very efficient. This system is equipped with the temperature sensor, rain drop sensor, and having the motor assembly for closing or opening the windows automatically.

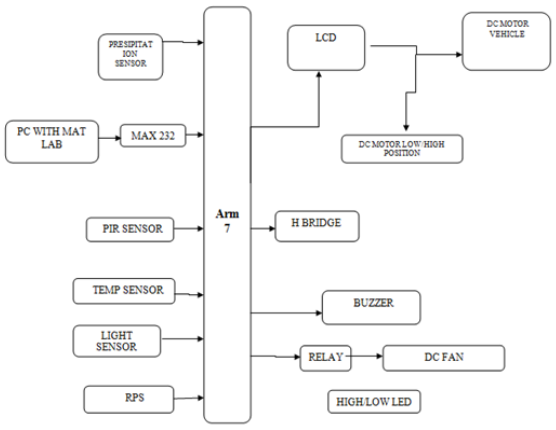

Fig 2.1block diagram

LITERATURE REVIEW:

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DEMERITS OF EXISTING SYSTEM

PURE ANOLOGY:

Previously existing systems are pure analogy systems. Which needs the manual operation, it does not having quality sensors for detection of the high temperature. This system does not support the predefined input data.

TIME INDEPENDENT OPERATION:

We cannot give the time to system for its operation set the time the existing systems are programmed to search only in a predefined path. There is no chance to dynamically alter the search path.

CANNOT ABLE TO ESTABLISH THE REMOTE COMMUNICATION:

The following system cannot able to provide the information regarding temperature condition to the user remotely.

UNINTELLIGENT:

Existing systems are unintelligent, it means it does not having micro controller. It simply collects the data analogy mode; based on that collecting voltage from the sensors, it performs the operation. It opens window when it receives the maximum voltage and close the door when cools.

ENVIRONMENTAL CONDITIONS:

It cannot accurately analyze the environmental conditions like temperature, detection of rains for closing or opening the windows itself.

LOW TROUGH PUT:

It was built over the analog system, so that analogy systems performances are time taking process, so these cannot provide the high speed operations.

INRODUCTION TO EMBEDDED SYSTEMS:

An embedded system is a special-purpose computer system designed to perform one or a few dedicated functions, sometimes with real-time computing constraints. It is usually embedded as part of a complete device including hardware and mechanical parts. In contrast, a general-purpose computer, such as a personal computer, can do many different tasks depending on programming. Embedded systems have become very important today as they control many of the common devices we use.Since the embedded system is dedicated to specific tasks, design engineers can optimize it, reducing the size and cost of the product, or increasing the reliability and performance. Some embedded systems are mass-produced, benefiting from economies of scale.

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Physically, embedded systems range from portable devices such as digital watches and MP3players, to large stationary installations like traffic lights, factory controllers, or the systems controlling nuclear power plants. Complexity varies from low, with a single microcontroller chip, to very high with multiple units, peripherals and networks mounted inside a large chassis or enclosure. In general, "embedded system" is not an exactly defined term, as many systems have some element of programmability. For example, handheld computers share some elements with embedded systems such as the operating systems and microprocessors which power them, but are not truly embedded systems, because they allow different applications to be loaded and peripherals to be connected.A Digital computer built on a single IC is called single chip microcomputer.

Such Computers are used in instrumentation automatic industrial control, process control, and home and consumer applications. As it is used for control applications it is called micro controller or embedded microcontroller. It is very small and compact. It contains CPU, ROM, RAM and I/O lines. There are so far many microcontrollers developed such as Texas instruments 4-Bit micro controller, TMS 1000, Motorola's 8-bit microcontroller 6801 and MC68HC11etc. In the year 1976, Intel introduced the 8048 series of single-chip microcomputers. It is also known as MICS-48. Then after in 1981, Intel Corporations introduced a more powerful series of 8-microcontrollers called 8051. The 8051 series of microcontrollers are faster, have enhanced instruction set, powers saving modes of operation, full duplex serial port etc.

Arm processor review:

ARM stands for Advanced RISC Machines. It is a 32 bit processor core, used for high end application. It is widely used in Advanced Robotic Applications. It performs number of instruction in a single cycle compare with other controllers it have advanced features. The Arm CPU with real-time emulation and embedded trace support,that combine microcontroller with embedded high speed flash memory ranging from 32 kB to 512 kB. A 128-bit wide memory interface and a unique accelerator architecture enable 32-bit code execution at the maximum clock rate. For critical code size applications, the alternative 16-bit Thumb mode reduces code by more than 30 % with minimal performance penalty. Due to their tiny size and low power consumption, LPC2141/42/44/46/48 are ideal for applications where miniaturization is a key requirement, such as access control and point-of-sale. Serial communications interfaces ranging from a USB 2.0 Full-speed device, multiple UARTs, SPI, SSP to I2C-bus and on-chip SRAM of 8 kB up to 40 kB, make these devices very well suited for communication gateways and protocol converters, soft modems, voice recognition and low end imaging, providing both large buffer size and high processing power.

History and Development:

- ARM was developed at Acron Computers ltd of Cambridge, England between 1983 and 1985.
- RISC concept was introduced in 1980 at Stanford and Berkley.
- ARM ltd was found in 1990.
- ARM cores are licensed to partners so as to develop and fabricate new microcontrollers around same processor cores.

Key features:

1. 16-bit/32-bit ARM7TDMI-S microcontroller in a tiny LQFP64 package.
2. 8 kB to 40 kB of on-chip static RAM and 32 kB to 512 kB of on-chip flash memory.
   128-bit wide interface/accelerator enables high-speed 60 MHz operation.

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3. In- System Programming/In-Application programming (ISP/IAP) via on-chip boot loader
software. Single flash sector or full chip erase in 400 ms and programming of
256 bytes in 1 ms.

Historical Background:

The invention of the transistor at Bell Telephone Laboratories in 1947 sparked a fast-growing microelectronic technology. Jack Kilby of Texas Instruments built the first integrated circuit (IC) in 1958 using germanium (Ge) devices. It consisted of one transistor, three resistors, and one capacitor. The IC was implemented on a sliver of Ge that was glued on a glass slide. Later that same year Robert Noyce of Fairchild Semiconductor announced the development of a planar double-diffused Si IC. The complete transition from the original Ge transistors with grown and alloyed junctions to silicon (Si) planar double-diffused devices took about 10 years. The success of Si as an electronic material was due partly to its wide availability from silicon dioxide (SiO2) (sand), resulting in potentially lower material costs relative to other semiconductors.

Related work:

The use of mobile devices for gathering traffic information is not a new concept; several works indicate the feasibility of an ITS based only on location samples gathered by mobile phones. An early work describes an analytical method for evaluating real-time ITS based on data collected from GPS devices in probe vehicles: a 3-5% of penetration in the traffic flow is enough for adequate traffic estimation. Recent experiments with a system implemented solely on mobile phones show encouraging results for the feasibility and the accuracy of the traffic estimation (compared to that obtained by fixed sensors): a 2-3% penetration of mobile phones running the application in the total car flow suffices for accurate estimation of the average speed. Moreover, commercial navigation applications already integrate location samples from mobile phones in their algorithms for route guidance. However, security and privacy of similar traffic systems remain open challenges and research is conducted in several projects. Successive location updates by a smart phone, even without any identifier, contain spatial and temporal correlation that can be used as indirect identifiers. These can be exploited to reconstruct user paths with tracking techniques . Then traces can be processed and matched in order to infer frequently visited places, e.g., home or workplace, and finally reveal the user identity.

To mitigate such threats, several solutions using cloaking techniques or privacy preserving sampling techniques have been proposed. These solutions are complementary to our proposal. In this paper we do not consider this kind of threat against the dataset of location samples. Rather, our goal is to guarantee the anonymity of the location samples and protect the system security. Relevant research in security is conducted for vehicular communication systems .Multiple short-term anonymized certificates, termed pseudonyms, can provide authentication while enhancing location privacy. These certificates are used for a short time and then have to be changed .Group signatures are also proposed, in order to reduce the overhead of pseudonym management.

As they are significantly costlier (in terms of communication and computation overhead) than classic public key cryptography, special care must be taken for the overall secure vehicular communications system design. Group signatures are also used in credentials systems such as Idemix that provide anonymity for authenticated transactions to services. In our proposed architecture we will use group signatures; based on initial implementation results.

POWER SUPPLY:

Power supply" is sometimes restricted to those devices that *convert* some other form of energy into electricity (such as solar power and fuel cells and generators). A more accurate term for devices that convert one form of electric power into another form (such as transformers and linear regulators) is power converter. The most common conversion is from AC to DC.

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TEMPERATURE SENSOR:

Temperature is the most-measured process variable in industrial automation. Most commonly, a temperature sensor is used to convert temperature value to an electrical value. Temperature Sensors are the key to read temperatures correctly and to control temperature in industrials applications.A large distinction can be made between temperature sensor types. Sensors differ a lot in properties such as contact-way, temperature range, calibrating method and sensing element. The temperature sensors contain a sensing element enclosed in housings of plastic or metal. With the help of conditioning circuits, the sensor will reflect the change of environmental temperature. In the temperature functional module we developed, we use the LM34 series of temperature sensors.

The LM34 series are precision integrated-circuit temperature sensors, whose output voltage is linearly proportional to the Fahrenheit temperature. The LM34 thus has an advantage over linear temperature sensors calibrated in degrees Kelvin, as the user is not required to subtract a large constant voltage from its output to obtain convenient Fahrenheit scaling. The LM34 does not require any external calibration or trimming to provide typical accuracies of ±1.2°F at room temperature and ±11.2°F over a full -50 to +300°F temperature range. The LM34 is rated to operate over a -50° to +300°F temperature range.

PASSIVE INFRARED SENSOR:

PIR sensor itself is split into two halves, which are sensitive to IR and whenever object comes in the field of view of the sensor, then positive differential change will be produced between two halves with the interception of the first half of the PIR sensor. Similarly, if the object leaves the field of view, then negative differential change will be produced. PIR or Passive Infrared sensor is named as passive because it doesn't emit any energy or radiation for detecting the radiation. There are different types of sensors used for detecting the motion and these PIR sensors are classified based on angle (wide area) over which they can detect motion of the objects like 110degrees, 180degrees and 360degress angles.

APPLICATION OF PIR SENSOR:

Automatic Door Opening System is a typical application of PIR sensors which is intended for automatic door closing and opening operations based on body movement near the door. PIR-sensor-based-automatic-door- opening system circuit mainly consists of a PIR sensor, an 8051 microcontroller, a driver IC, a door motor.

LIQUID CRYSTAL DISPLAY:

LCD stands for **L**iquid **C**rystal **D**isplay. LCD is finding wide spread use replacing LEDs (seven segment LEDs or other multi segment LEDs) because of the following reasons.The declining prices of LCDs.

1. The ability to display numbers, characters and graphics. This is in contrast to LEDs, which are limited to numbers and a few characters.
2. Incorporation of a refreshing controller into the LCD, thereby relieving the CPU of the task of refreshing the LCD. In contrast, the LED must be refreshed by the CPU to keep displaying the data.
3. Ease of programming for characters and graphics.
4. These components are "specialized" for being used with the microcontrollers, which means that they cannot be activated by standard IC circuits. They are used for writing different messages on a miniature LCD.

Figure 4.13 LCD

A model described here is for its low price and great possibilities most frequently used in practice. It is based on the HD44780 microcontroller (*Hitachi*) and can display messages in two lines with 16 characters each. It displays all the alphabets, Greek letters,

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punctuation marks, mathematical symbols etc. In addition, it is possible to display symbols that user makes up on its own. Automatic shifting message on display (shift left and right), appearance of the pointer, backlight etc. are considered as useful characteristics

KEIL SOFTWARE:

It is possible to create the source files in a text editor such as Notepad, run the Compiler on each C source file, specifying a list of controls, run the Assembler on each Assembler source file, specifying another list of controls, run either the Library Manager or Linker (again specifying a list of controls) and finally running the Object-HEX Converter to convert the Linker output file to an Intel Hex File. Once that has been completed the Hex File can be downloaded to the target hardware and debugged. Alternatively KEIL can be used to create source files; automatically compile, link and covert using options set with an easy to use user interface and finally simulate or perform debugging on the hardware with access to C variables and memory. Unless you have to use the tolls on the command line, the choice is clear. KEIL Greatly simplifies the process of creating and testing an embedded application.

Projects:

The user of KEIL centers on "projects". A project is a list of all the source files required to build a single application, all the tool options which specify exactly how to build the application, and – if required – how the application should be simulated. A project contains enough information to take a set of source files and generate exactly the binary code required for the application. Because of the high degree of flexibility required from the tools, there are many options that can be set to configure the tools to operate in a specific manner. It would be tedious to have to set these options up every time the application is being built; therefore they are stored in a project file. Loading the project file into KEIL informs KEIL which source files are required, where they are, and how to configure the tools in the correct way.

KEIL can then execute each tool with the correct options. It is also possible to create new projects in KEIL. Source files are added to the project and the tool options are set as required. The project can then be saved to preserve the settings. The project is reloaded and the simulator or debugger started, all the desired windows are opened. KEIL project files have the extension.

Simulator/Debugger:

The simulator/ debugger in KEIL can perform a very detailed simulation of a micro controller along with external signals. It is possible to view the precise execution time of a single assembly instruction, or a single line of C code, all the way up to the entire application, simply by entering the crystal frequency. A window can be opened for each peripheral on the device, showing the state of the peripheral. This enables quick trouble shooting of mis-configured peripherals. Breakpoints may be set on either assembly instructions or lines of C code, and execution may be stepped through one instruction or C line at a time.

The contents of all the memory areas may be viewed along with ability to find specific variables. In addition the registers may be viewed allowing a detailed view of what the microcontroller is doing at any point in time. The Keil Software 8051 development tools listed below are the programs you use to compile your C code, assemble your assembler source files, link your program together, create HEX files, and debug your target program. µVision2 for Windows™ Integrated Development Environment: combines Project Management, Source Code Editing, and Program Debugging in one powerful environment.

- C51 ANSI Optimizing C Cross Compiler: creates relocatable object modules from your C source code,
- A51 Macro Assembler: creates relocatable object modules from your 8051 assembler source code,
- BL51 Linker/Locator: combines relocatable object modules created by the compiler and assembler into the final absolute object module,

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- LIB51 Library Manager: combines object modules into a library, which may be used by the linker,
- OH51 Object-HEX Converter: creates Intel HEX files from absolute object modules.

What's New in µVision3?

µVision3 adds many new features to the Editor like Text Templates, Quick Function Navigation, and Syntax Coloring with brace high lighting Configuration Wizard for dialog based startup and debugger setup. µVision3 is fully compatible to µVision2 and can be used in parallel with µVision2.

Result:

The project "Microcontroller Managed Module For Automatic Ventilation of Vehicle Interior" been successfully designed and tested**.** Integrating features of all the hardware components used have developed it. Presence of every module has been reasoned out and placed carefully thus contributing to the best working of the unit. Secondly, using highly advanced IC's and with the help of growing technology the project has been successfully implemented.

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