Design and Monitoring of Smart Roads Based on Weather Data by using IoT

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Abstract. The key goal of this research is to avoid road accidents. Most of the studies clearly show that the majority of incidents take place near certain places such as school areas, dining areas, etc. The purpose of the proposed system is, by signaling or warning through WI-FI, to avoid the accident in nearby areas. If the Bridge zone is narrower than 100 meters from vehicles, a mobile warning will be issued via the WI-FI network. The person reduces the vehicle speed following this indication. Just like if a school area closer to vehicles is within 100 meters, the cell phone will be alerted via WI-FI. The person reduces the speed of the vehicle after this indication. Like Fog, it gives message warning to mobile devices via the WI-FI area within 100 meters. The individual decreases the speed of the vehicle following this indication. This sign helps us to reduce road injuries. We use WI-FI, AT89S52, switches for this implementation. The Wi-Fi module is connected to the controller here in this project and can be controlled from any location at the Internet speed. The managed power supply for this project is 5V 500mA. For voltage power, 7805 three voltage terminal regulators are used. Full-wave bridge rectifier is used to rectify the 230/12V transformer secondary ac output.

Keywords: 8051, Internet of Things (IoT), Traffic Jams, Accidents, Wi-Fi, RF.

1. Introduction

Traffic signal management systems co-ordinate traffic signals for the purposes of achieving network-wide goals for traffic operations. These systems consist of inter-sectional traffic signals, another network of communications which connect them as well as a central computer or machine network for manage the process. A set of strategies, including time base and hardwired communication approaches, may enforce coordination. Agency-wide co-ordination of traffic signals includes the establishment of agreements on data sharing and traffic signal control. Therefore the establishment of formal or informal agreements to exchange knowledge about the traffic regulation and control of signal service across jurisdictions is a key institutional component of Traffic Signal Management. In order to provide control, signal synchronization systems are mounted. There is no other reason for a traffic signage system than to provide motorists with a positive signal time. The program provides functions that maximize the capacity of the engineer to accomplish this objective. Those are primarily control characteristics. They have access for maintenance and operations to the intersection signal controller. Then the more connection is complete as well as comfortable, the more effective and efficient the operator is. There are also large monitoring features on present networks, including different modes of traffic detection as well as video surveillance, as well as signal traffic control. These also offer more efficient algorithms for traffic management, including the possibility of adaptive and predictive management.
Described KSA alert systems for low-cost camel detection and IoT-based. These are devices that link to the internet and stop vehicle drivers. The primary benefits of the proposal IT dependency and low traffic are the rule over similar systems Specifications. This can also be used for surveillance and anywhere repair. In addition, congestion in the network reliabiltiy and efficiency Trustworthy [1]. Most incidents are caused by loose events camels on roads and the use of mobile phones [2]. [1] A functional framework for KSA must therefore be implemented. Reduction of crashes for camel vehicle. Any program for preventing accidents in animals is broken the animal identification part and the two main parts; Piece of warning. A list of animals already used in Switzerland, detection systems are the only. 81.52% of the overall Net drop of significant animal injuries [3]. Several animal detection studies are possible and its Systems for driver alert [3]. Common methods including Alert signs/lighting, road fence, etc. are very necessary. Installation as well as maintenance costs [4,5] are high. And Other Wireless network sensor technology is effective Consumption and maintenance costs [6–11] terms and conditions of electricity. While techniques based on wireless sensor systems like [4] suffer, wide alarms and inaccuracy of false detection. In addition, most of these experiments are not appropriate for camel and KSA desert track identification. Moreover, installation and servicing may be very expensive. Road safety and traffic laws are not a modern concept; businesses have traffic rules for several decades in place to guarantee the security of road law and order and that drivers and pedestrians are protected. Because of ineffective implementation of traffic laws, developed nations are struggling with the question of crowded as well as congested highways. A lack of knowledge of the commentator's rules is present. Furthermore, drivers also appear to forget the rules. It is also particularly difficult for inexperienced drivers driving on unknown roads to obey the rules. This is one of the primary causes of injuries. Therefore it is necessary to create a system that assists the driver in directing the rules on traffic or road safety, as well as to automate the reaction of the car to the driver's ignorance in order to comply with the rules.

The main objective of the road safety framework is to ensure road safety in order to avoid injuries caused by a driver's negligence leading to death. The smart traffic structure proposed is also beneficial because of its unique features and capabilities of the Internet of Things (IoT). [12]. In [13], This system offers real-time road safety tracking to tackle the challenges of violating the rules. The method proposed is a modern way of regulating traffic laws and a new way of achieving individual vehicles that conform with traffic rules. The traffic control department will use this real-time road safety monitoring system to detect dangerous conditions on the road and then respond by imposing emergency action. All of the information contained in the archive that is present in the cloud is checked and confirmed. In this way, the automation of traffic laws over a car would protect the driver from breaching traffic rules. In addition, the system helps to restrict the car's speed by reducing the possibility of accidents.

2. Methodology
There will be two parts of the suggested method, one is the transmitter section and the second is the receiver section. The block diagram in Figure 1 shows the transmitter section it contains different zones. Data from those particular zones from the switches and sensors will be given to RF transmitter. RF transmitter transmits the data and at receiver side as shown in the Figure 2 it contains the micro
controller to process the data, which has received from the RF receiver. Later after processing we can monitor all the things in the website, as the device is also connected with the WIFI module.

2.1 Transmitter Section
AT89S52 is also an 8-bit, low-power, 8-bit in-command flash memory CMOS microcontroller for 8 K bytes. The computer is developed using ATMEL’s non-volatile high-density memory technology as well as complies with the 80C51 pin as well as instruction set of the industry standard. The flash feature allows you to reprogram your program's memory from either your device or a normal non-volatile memory programmer. The ATMEL AT89S52 is a powerful microcontroller that generates a highly versatile and economical solution for many embedded control applications by combining a flexible, 8-bit CPU with a flash programmable processor on a monolithic chip. The AT89S52 features a total of 8 Kilo bytes of flash, a total of 256 bytes of RAM, a 32 I/O block, a monitor timer, two data points, three 16-bit timers/counter, a six-vector duplex serial port, an on-chip oscillator as well as a clock track.

The AT89S52 is nevertheless configured with a static operating logic for null frequency and enables two saves in programming mode. The Idle Mode interrupts the kernel and requires the functions of RAM, timer and process interference to be executed. The RAM material is saved by Power-down, but the OSC freezes before the next break is complete.

2.2 Receiver Section
The STT-433 is suitable for low-cost, longer-range remote control applications. The transmitter is supplied with 1.5-12V and is thus suitable for applications with battery power. That the transmitter uses a SAW-stabilized oscillator to ensure precise frequency modulation at the highest possible output. Easy to control output power and harmonic emissions, making compliance with FCC and ETSI simple. The STT-433 is suitable for high-volume applications. ESP8266 offers a full Wi-Fi networking solution, which enables the device to be hosted or the Wi-Fi network to be accessed from another application processor. ESP8266 is able to boot directly from an external flash if the device is hosting and the only
device processor in the devise. In addition, wireless internet access through the UART interface or CPU AHB bridge interface can also be extended as a Wi-Fi adapter to any microcontroller-based (shown in Figure 3) device. Throughout addition, wireless internet access can also be applied to any microcontroller-based system.

**Figure 2.** Block diagram of receiver section

**Figure 3.** 8052 Micro controller

**Figure 4.** RF module

**Figure 5.** Wi-Fi module
The ESP8266EX provides a highly designed WiFi SoC solution that addresses consumer needs in the Internet of Things industry for effective power usage, lightweight design and stable efficiency. Thanks to full and self-contained Wi-Fi networking capability, the ESP8266EX can run as a standalone programme or as a host MCU slave. As ESP8266EX hosts the script, the programme starts immediately. The high-speed cache built-in contributes to system reliability and utilization of system memory. The ESP8266EX can also be used as an SPI / SDIO or I2C.

UART interface for all microcontrollers’ designs as a Wi-Fi adaptor shown in Figure 5. ESP8266EX integrated antenna switches, RF shown in Figure 4 and 6, control amplifier, amplifier, filters and modules for power management. The compact design reduces the size of the PCB and needs minimal external circuits.
Figure 7. Circuit diagram of RF receiver.
As well as the Wi-Fi features, an improved version of the Tensilica 32-bit Diamond Processor and on-chip SRAM series is also available in the ESP8266EX. It can be linked via GPIOs to external sensors and other devices. Sample codes for different applications are issued by the Software Development Kit (SDK). The circuit diagram of RF transmitter and receiver is shown in Figure 6 and 7. The hardware setup is shown in Figure 8.

The Descriptive Systems Smart Communication Platform (ESCP) offers the possibility for standard wireless, Bluetooth, DD Radiation (DDR), LVDS as well as LCD disturbance management to use advanced signal processing, spur-calling as well as radio co-existence mechanisms to easily switch between sleep and wake-up mode.

3 Conclusion
The concept of smart roads monitoring with warning messages to diversions was successfully planned and checked according to climate conditions as well as unpredictable incidents such as collisions or traffic jams. It has been built with the integration of all the hardware components used. The existence of each module was reasoned out and carefully positioned, so that the device functions best. Furthermore, the project was successfully carried out using highly advanced ICs and with the aid of that technology.

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