SMART HELMET AND VEHICLE SPEED CONTROL SYSTEM USING RF TECHNOLOGY

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ABSTRACT--*In a developing nation like India, with advancement in the transportation technology and rise in the total number of vehicles, road accidents increase rapidly. Two wheelers accounts for 25% of total road crash death. This project provides an intelligent system for two wheeler accident preventing and detection for human life safety. The prevention part involves, Smart Helmet, which automatically checks whether the person is wearing the helmet. The relay does not ON the engine if these conditions are not satisfied. And speed will be controlled and reduced when the person crossed from the school, college & hospital. The microcontroller controls the function of relay and thus the ignition. At the point when the rider met with an accident, the sensor recognizes the condition of the motorbike and reports the accident. Then the GPS in the bike will send the location of the accident place to main server of the nearby hospitals.*

I. INTRODUCTION

In less developed countries, road traffic accidents were the most significant cause of injuries, ranking eleventh among the most important causes of lost years of healthy life. In Indian road system, widening of the road is not an alternative solution to avoid traffic in such a cities. The problems with state drunk driving control systems can be solved in many ways. The most effective will follow several principles: They will invest authority and responsibility in people and organizations at all levels, local to national, because drunken driving control requires action at all levels. They will operate in the public eye, using the media to report on problems and solutions, because ultimate decisions on priorities and resources to control drunk driving must have public support. They will not promise instant solutions based on a single action but rather will take steady steps towards long-term improvement. And they will establish mechanisms for identifying and solving problems rather than attempting to apply one-size fits-all methods. Hence

Road Safety becomes a major issue of concern. Therefore it becomes necessary to implement such a technique which is not easy to bypass the basic rule of wearing helmet and to control the speed of the motor bike while crossing the schools, colleges and hospitals etc. Here we designed a system which checks the conditions before turned ON the engine of the bike. Our system includes an Rf receiver, Rf transmitter and a helmet sensing switch. A switch is used to detect whether the bikers wearing helmet.

Transmitter and receiver is used to detect the speed of the biker is, the output is fed to the MCU. Both the switch and the receivers are fitted in the helmet. MCU is the microcontroller unit, which controls all the functions of other blocks in this system. MCU takes or read data from the sensors and controls all the functions of the whole system by manipulating these data. Rf receiver and transmitter is connected to the MCU through an interfacing circuit and the helmet sensing switch is directly connected to the MCU. MCU receives data from these sensors and it gives a digital data corresponding to the output of sensors to the encoder only if the

conditions are satisfied.

Organization

The remainder of this paper is organized as follows. Section 2 introduces related works. Section 3 briefly presents preliminaries and the system model. Section 4 describes the system architecture and adversary model. Section 5 describes the construction of group data sharing model. Section 6 shows the block design based key agreement protocol with the general formulas for calculating the common conference key for multiple participants. Section 7 and Section 8 present the security analysis and performance analyses, respectively. Finally, conclusions are drawn in Section 9. To understand our protocol well, the detailed process of the key agreement.

II. RELATED WORKS

An Intelligent road traffic control system This paper reveals the use of a microcontroller to optimize timing plans according to traffic conditions in real-time. The control system is designed to be able to optimize the traffic flow using several kinds of strategies, which are green time split and time slot, green time extension, and offset optimization strategy and the transfer of data related to local conditions to a network control base. This provides diversity in control and shows how several control strategies can be used and switched over to provide best control. The solution is cost-effective too employing minimum number of sensors.

III. SYSTEM ANALYSIS

EXISTING SYSTEM

In the existing system, the sensors are used such as IR sensor, load sensor, vibration sensor and gas sensor. The gas sensor detects the measure of liquor consists in the breath of a person wearing the helmet. The Alcohol recognition sensors connected with the helmet in distinguish the Alcohol detection. MEMS based handle bar control of the vehicle. The Vibration sensor is used to detect any accident. Load checking to recognize the load of the vehicle and alongside the sensor to locate the quantity of individuals travelling in the bike.

PROPOSED SYSTEM

We designed a system which checks the conditions before turned ON the engine of the bike. A switch is used to detect whether the biker is wearing helmet or not. When the vehicle passes from schools, hospitals etc controlling the vehicle are done. Within certain area across the schools, hospitals the transmitter will be keep, if the vehicle passes from that area the receiver kept in the vehicle receives the signal from that transmitter and that signal is fed to the controller and with the help of switching circuit the vehicle is controlled.

BLOCK DIAGRAM

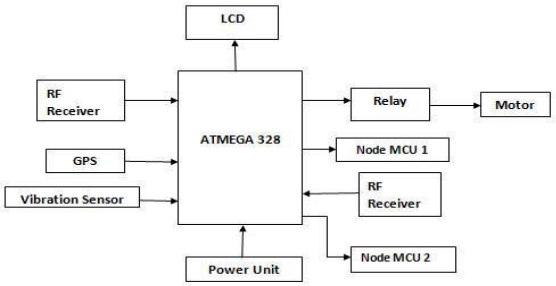

Fig.1 BIKE PART

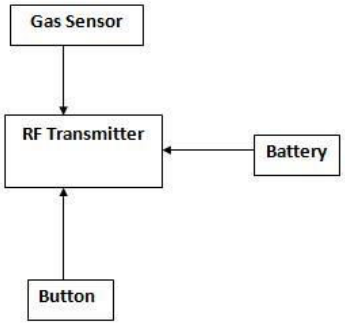

Fig 2.HELMET PART

Within certain area across the schools, hospitals the transmitter will be keep, if the vehicle passes

from that area the receiver kept in the vehicle receives the signal from that transmitter and that signal is fed to the controller and with the help of switching circuit the vehicle is controlled. When vehicle met accident the location will be shared via Node MCU. At mega 328 is a microcontroller board which is used here to read analog data from the RF receiver and convert that data into digital form using mathematical algorithms. The micro-controller board will also control the receivers and sequence of their functioning; in a way that data from RF receiver is continuously read by the controller board and when it identifies speed of the bike based on predefined threshold values, it will control the speed of the motor which is connected with this board.

IV. METHODOLOGY

MICROCONTROLLER

The Arduino Uno is a microcontroller board based on the ATmega328 (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.

The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega16U2 (Atmega8U2 up to version R2) programmed as a USB-to-serial converter. Revision 2 of the Uno board has a resistor pulling the 8U2 HWB line t o ground, making it easier to put into DFU mode.

Revision 3 of the board has the following new features:

The second one is a not connected pin, that is reserved for future purposes.

Stronger RESET circuit.

Atmega 16U2 replace the 8U2.

"Uno" means one in Italian and is named to mark the upcoming release of Arduino 1.0. The Uno and version 1.0 will be the reference versions of Arduino, moving forward. The Uno is the latest in a series of USB Arduino boards, and the reference model for the Arduino platform; for a comparison with previous versions, see the index of Arduino boards

Power

The Arduino Uno can be powered via the USB connection or with an external power supply. The power source is selected automatically. External (non-USB) power can come either from an AC-to-DC adapter (wall-wart) or battery. The adapter can be connected by plugging a 2.1mm center-positive plug into the board's power jack. Leads from a battery can be inserted in the Gnd and Vin pin headers of the POWER connector. The board can operate on an external supply of 6 to 20 volts. If supplied with less than 7V, however, the 5V pin may supply less than five volts and the board may be unstable. If using more than 12V, the voltage regulator may overheat and damage the board. The recommended range is 7 to 12 volts. The power pins are as follows:

VIN. The input voltage to the Arduino board when it's using an external power source you can supply voltage through this pin, or, if supplying voltage via the power jack, access it through this pin.

3V3. A 3.3 volt supply generated by the on-board regulator. Maximum current draw is 50 mA.

GND. Ground pins.

Memory

The ATmega328 has 32 KB (with 0.5 KB used for the bootloader). It also has 2 KB of SRAM and 1 KB of EEPROM (which can be read and written with the EEPROM library).

Input and Output

Each of the 14 digital pins on the Uno can be

used as an input or output, using pin Mode (), digital Write(), and digital Read() functions. They operate at 5 volts. Each pin can provide or receive a maximum of 40 mA and has an internal pull-up resistor (disconnected by default) of 20-50 ohms. In addition, some pins have specialized functions:

Serial: 0 (RX) and 1 (TX). Used to receive (RX) and transmit (TX) TTL serial data. These pins are connected to the corresponding pins of the ATmega8U2 USB-to-TTL Serial chip.

SPI: 10 (SS), 11 (MOSI), 12 (MISO), 13 (SCK). These pins support SPI communication using the SPI library.

LED: 13. There is a built-in LED connected to digital pin 13. When the pin is HIGH value, the LED is on, when the pin is LOW, it's off.

The Uno has 6 analog inputs, labeled A0 through A5, each of which provide 10 bits of resolution (i.e. 1024 different values). By default they measure from ground to 5 volts, though is it possible to change the upper end of their range using the AREF pin and the analogReference() function. Additionally, some pins have specialized functionality:

TWI: A4 or SDA pin and A5 or SCL pin. Support TWI communication using the Wire library.

There are a couple of other pins on the board:

AREF. Reference voltage for the analog inputs. Used with analog Reference().

Reset. Bring this line LOW to reset the microcontroller. Typically used to add

Communication

The Arduino Uno has a number of facilities for communicating with a computer, another Arduino, or other microcontrollers. The ATmega328 provides UART TTL (5V) serial communication, which is available on digital pins 0 (RX) and 1 (TX). An ATmega16U2 on the board channels this serial communication over USB and appears as a virtual com port to software on the computer. The '16U2 firmware uses the standard USB COM drivers, and no external driver is needed. However, on Windows, a .inf file is required. The Arduino software includes a serial monitor which allows simple textual data to be sent to and from the Arduino board. The RX and TX LEDs on the board will flash when data is being transmitted via the USB-to-serial chip and USB connection to the computer (but not for serial communication on pins 0 and 1). A Software Serial library allows for serial communication on any of the Uno's digital pins. The ATmega328 also supports I2C (TWI) and SPI communication. The Arduino software includes a Wire library to simplify use of the I2C bus; see the documentation for details. For SPI communication, use the SPI library.

Programming

The Arduino Uno can be programmed with the Arduino software (download). Select "Arduino Uno from the Tools > Boardmenu (according to the microcontroller on your board). For details, see the reference and tutorials. The ATmega328 on the Arduino Uno comes preburned with a bootloader that allows you to upload new code to it without the use of an external hardware programmer. It communicates using the original STK500 protocol (reference, C header files). It can also bypass the bootloader and program the microcontroller through the ICSP (In-Circuit Serial Programming) header; see these instructions for details. The ATmega16U2 (or 8U2 in the rev1 and rev2 boards) firmware source code is available. The ATmega16U2/8U2 is loaded with a DFU bootloader, which can be activated by:

On Rev1 boards: connecting the solder jumper on the back of the board (near

the map of Italy) and then resetting the 8U2.
On Rev2 or later boards: there is a resistor that pulling the 8U2/16U2 HWB line to ground, making it easier to put into DFU mode.

USB Over current Protection

The Arduino Uno has a resettable poly fuse that protects your computer's USB ports from shorts and overcurrent. Although most computers provide their own internal protection, the fuse provides an extra layer of protection. If more than 500 mA is applied to the USB port, the fuse will automatically break the connection until the short or overload is removed.

Physical Characteristics

The maximum length and width of the Uno PCB are 2.7 and 2.1 inches respectively, with the USB connector and power jack extending beyond the former dimension. Four screw holes allow the board to be attached to a surface or case. Note that the distance between digital pins 7 and 8 is 160 mil (0.16"), not an even multiple of the 100 mil spacing of the other pins.

ATMEGA 328 Features:

Features

High Performance, Low Power

AVR 8-Bit Microcontroller

Advanced RISC Architecture

131 Powerful Instructions – Most Single Clock Cycle Execution
32 x 8 General Purpose Working Registers

Fully Static Operation

Up to 20 MIPS Throughput at 20 MHz On-chip 2-cycle Multiplier

High Endurance Non-volatile Memory Segments
4/8/16/32K Bytes of In-System Self-Programmable Flash progam memory

Write/EraseCycles:10,000 Flash/100,000 EEPROM

Optional Boot Code Section with Independent Lock Bits In System Programming by On-chip Boot Program True Read While-Write Operation Programming Lock for Software Security

Peripheral Features

Six PWM Channels 8-channel 10-bit ADC in TQFP and QFN/MLF package Temperature Measurement -channel 10-bit ADC in PDIP Package Programmable Serial USART Master/Slave SPI Serial Interface Byte-oriented 2-wire Serial Interface Programmable Watchdog Timer with Separate On-chip Oscillator On-chip Analog Comparator Interrupt and Wake-up on Pin Change

ARCHITECTURE

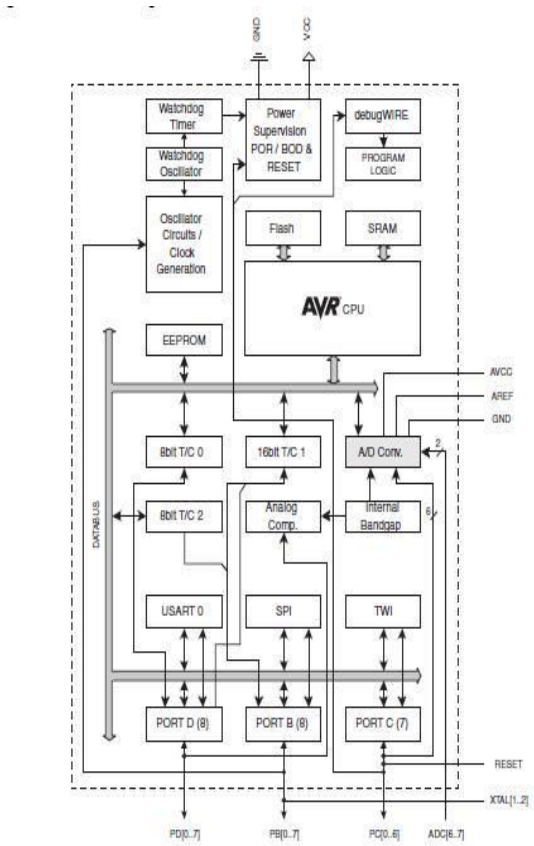

Fig.3 Architecture

AVCC

AVCC is the supply voltage pin for the A/D Converter, PC3:0, and ADC7:6. It should be externally connected to VCC, even if the ADC is not used. If the ADC is used, it should be connected to VCC through a low-pass filter. Note that PC6..4 use digital supply voltage, VCC.

AREF

AREF is the analog reference pin for the A/D Converter.1.1.9 ADC7:6 (TQFP and QFN/MLF Package Only)In the TQFP and QFN/MLF package, ADC7:6 serve as analog inputs to the A/D converter. These pins are powered from the analog supply and serve as 10-bit ADC channels

RELAY SWITCH

A relay is an electromagnetic switch that is used to turn on and it turn off a circuit by a low power signal or several circuits must be controlled by one signal. Relays are simple switches which are operated both electrically and mechanically. Relays consist of an electromagnet and also a set of contacts.

BATTERY

Single Battery of 9V is used to drive the bike.
Battery is used for the purpose of mobility.

LCD

A liquid-crystal display (LCD) is a flat panel display, electronic visual display, or video display that uses the light modulating properties of liquid crystals. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits.

RF MODULE

An RF module (radio frequency module) is a (usually) small electronic device used to transmit and/or receive radio signals between two devices. In an embedded system it is often desirable to communicate with another device wirelessly.

Power unit

Power offer may be a relevance a supply of power. A device or system that provides electrical or alternative sorts of energy to the output load or cluster of hundreds is termed an influence offer unit or PSU. The term is most ordinarily applied to electricity provides, less usually to mechanical ones, and infrequently to others. Power provides for electronic devices is generally divided into linear and shift power provides.

Rectifier

There square measure many ways that of connecting diodes to create a rectifier to convert AC to DC. The bridge rectifier is that the most significant and it produces full-wave variable DC. A rectifier may be made up of simply 2 diodes if a centre-tap electrical device is employed, however, this methodology isn't used currently that diodes square measure cheaper. A single diode will be used as a rectifier however it solely uses the positive (+) components of the AC wave to provide half-wave variable DC.

V. CONCLUSION

The accident prevention and detection part involves in this project, Smart Helmet, which automatically checks whether the person is wearing the helmet. The relay does not ON the engine if these conditions are not satisfied. A prototype model of controller is built on the speed mixing capability. The signal from sign board of various zones (school zone, college, hospitals etc) is treated individually & generates input signals for driving actuators – bike engine and additional DC motor. They, in turn, jointly control the speed of vehicle wheels. This design successfully utilizes a new idea of hybrid vehicle recently immerged in automotive industry. The system does not require a physical braking subsystem which will reduce the overall cost of a bike.

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