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Smart Helmet System for Accident Detection

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ABSTRACT: Motorcycles are by their nature far less crashworthy than closed vehicles. They are also less visible to other drivers and pedestrians and less stable than four-wheel vehicles. Operating a motorcycle requires a different combination of physical and mental skills than those used in driving four-wheel vehicles. Motorcyclists and their passengers are more vulnerable to the hazards of weather and road conditions than drivers in closed vehicles.The working of this smart helmet using Arduino is very simple, we place vibration sensors in different places of helmet where the probability of hitting is more which are connected to Arduino board. So, when the rider crashes and the helmet hits the ground, the sensors sense and the Arduino extract GPS data using the GPS module that is interfaced with Arduino. When the data exceeds minimum stress limit then GSM module automatically sends message to ambulance or police or family members. Sensors, Wi-Fi enabled processor, and cloud computing infrastructures are utilized for building the system.

KEYWORDS: Microcontroller, Segmentation, Arduino,Raspberry Pi,Internet of Things.

I. INTRODUCTION

Up to 75% of all deaths occur within the first one hour of impact. Thus, in this crucial phase of time, if proper aid reaches the victims, mortality rates can be reduced. Today a number of countries has made it mandatory to wear helmet for both rider and pillion rider. Due to rise in road accidents, it has now become essential to develop a system to minimize accidental deaths.

C.Nagarajan *et al.*[1] proposed build an Internet of Things (IoT) application that leverages on ubiquitous connectivity, sensing and data analytics that are the basis of IoT applications. C.Nagarajan *et al.*[5] of smart machines interacting and communicating with other machines, objects, environments and infrastructures.

The huge volumes of data thus generated, is processed into useful actions that can “command and control” things, to make our lives much easier and safer. IoT applications introduce numerous benefits like the capability to remotely monitor, manage and control devices, and to get new insights and useful information from massive streams of real-time data. The foundation however lies on the intelligence of the embedded processor.

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The system integrates the camera where we have the facility to capture the stills of the particular pointedplace whereas these still images can be converted to video

II.METHODOLOGY

Acquaintance of Segment

The Arduino Uno is a microcontroller board based on the ATmega328 . 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.OV7670 camera is used in the recording with the digital image processing for image acquisition and processing application based on TTL communication interface,very convenient to connect with Arduino controller,able to read the image and data through

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the COM6 serial port.This module allows to capture image in VGF format (640*480).It can perform some initial processing and transfer the images to the microcontrollers through the SCCB interface.The unit allows to form in other formats too with the manual adjustments.

Frequency Variation

GSM module requires a SIM card just like mobile phones to activate communication with the network. In our system we are using GSM SIM 900. We are using GSM to inform family members about the accident and various other parameters like fuel theft, towing of bike and in case of emergency.The MODEM needs AT commands, for interacting with processoror controller,these are then communicated through serial communication. These commands are sent by the controller/processor. The MODEM sends back a result after it receives a command .AT commands used .

are :

AT+CMGS= Sends an SMS message to a GSM phone

AT+CMGF = Sets the GSM modem in SMS Text Mode or SMS PDU Mode

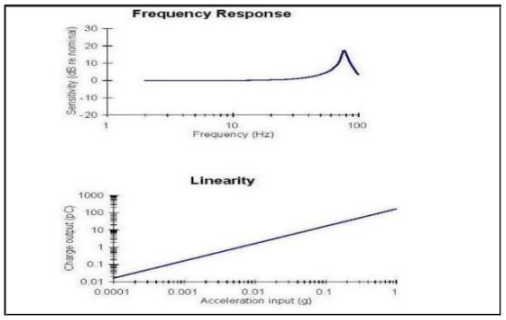

Figure 2.Frequency Variation

Eradication of the threshold value

Figure 3 shows The MiniSense 100acts as a cantilever-beam accelerometer. When the beam is mounted horizontally, acceleration in the vertical plane creates bending in the beam, due to the inertia of the mass at the tip of the beam. Strain in the beam creates a piezoelectric response, which may be detected as a charge or voltage output across the electrodes of the sensor.. Impacts containing high-frequency components will excite the resonance frequency, as shown in the plot above (response of the MiniSense 100 to a single halfsine impulse at 100 Hz, of amplitude 0.9 g). The ability of the sensor to detect low frequency motion is strongly influenced by the external electrical circuit, The simple representation of a pressure sensor

Threshold Monitoring:

The core element of the model is the arduino board which controls and manages all the functions performed by the other components of the model. The instructions to the components are given through arduino programming language

Rol	Pit	Vib
0	0	off
138	256	on
280	456	on
147	279	on

Sending SOS

The vibration sensor is connected to the A0 pin of the Arduino. The output of vibration sensor is analog signal so it is connected to the analog inputs of the Arduino. The GPS module is connected to the Rx and Tx pins of Arduino. Here we only take values from GPS module so there is no need of connecting Tx pin.The GSM module is connected to 4

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and 5 pins of Arduino which are assigned as Rx and Tx using software serial. Here we are only transmitting to gsm module so there is no need of connecting Rx pin. Power to all these components will be taken from arduino 5v power supply.The message is then transmitted to the relevant contacts.

Recording at the point of accident

The Controller Interface holds the adopted Raspberry pi microcontroller comprised of Broadcom processor.This includes a cron job which automates a python program to run immediately after the system boots.The Program waits for the input signal from the vibration sensor which experiences vibrationand triggers an input signal.Vibration sensor is connected to the GPO pin of raspberry pi.After receiving the signal from vibration sensor the program starts recording video from thecamera for respect time period and saves it as a video file.h264 format.The video file is saved to the external flash storage media inserted to the raspberry pi.Arduiino and raspberry pi should get started together .Flash media should be inserted into raspberry pi before switching on.

The Baud rate supported by the modem is between

9600 and 115200. Make sure the host system is setup to the supported baud rate. The modem automatically sets to the baud rate of the first command sent by the host system after it is powered up. User must first send “A” to synchronize the baud rate. It is recommended to wait 2 to 3seconds before sending “AT” character.

Experiments and Results

In our experiment, thethreshold inputof vibrator sensor used was 50db, and it yielded the best results.So there is no need for setting the baud rate using commands. Before You Start using the modem, please make sure that the SIM card you inserted support the needed features and there is

enough balance in SIM.

Summary ofResults

The Smart helmet developed is a smart and reliable piece of technology that is cheap to develop and operate and yet not compromise on safety. Additionally, it offers several advantages over the existing methods of accident detection and notification systems that rely heavily on the data collected from cellular devices of the drivers. Also,

most of the systems that are available in the automobile market are designed for only four-wheeled vehicles. Thus, the Internet of Things proposed in this paper will prove to ensure greater safety for the motorists.

III.CONCLUSION

The proposed method for the accident detection system with the help of the variant sensors by continuously monitoring the eradication above the threshold values. This paves way to prevent most of the accidents indeed.the helmet is equipped with a camera mounted to the helmet and the entire video will be recorded and it will be stored in the data storage of the helmet and the videos can be accessed wirelessly so the helmet will act like a BLACK BOX containing all dat

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