GSM & GPS BASED ROAD VEHICLE ACCIDENT REPORT SYSTEM USING MEMS SENSOR

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Wireless black box using MEMS accelerometer and GPS tracking system is developed for accidental monitoring. The system consists of cooperative components of an accelerometer, microcontroller unit, GPS device and GSM module. In the event of accident, this wireless device will send mobile phone short massage indicating the position of vehicle by GPS system to family member, emergency medical service (EMS) and nearest hospital. The threshold algorithm and speed of motorcycle are used to determine fall or accident in real-time. The system is compact and easy to install under rider seat. The system has been tested in real world applications using bicycles. The test results show that it can detect linear fall, non-linear fall and normal ride with high accuracy.

I. INTRODUCTION

The motorcycle accident is a major public problem in many countries, particularly Thailand. Despite awareness campaign, this problem is still increasing due to rider's poor behaviors such as speed driving, drunk driving, riding with no helmet protection, riding without sufficient sleep, etc. The numbers of death and disability are very high because of late assistance to people who got the accident. These cause huge social and economic burdens to people involved. Therefore, several research group and major motorcycle manufacturers including Honda have developed safety devices to protect riders from accidental injuries. However, good safety device for motorcycle is difficult to implement and very expensive.

In this project GPS is used to monitor the vehicle position any where in the earth. The vehicle who wants to monitor has to have the GPS sensor. The GPS sensor consists of GPS antenna and GPS receiver. GPS uses satellite ranging to triangulate your position. In other words, the GPS unit simply measures the travel time of the signals transmitted from the satellites, then multiplies them by the speed of light to determine exactly how far the unit is from every satellite its sampling. By locking onto the signals from a minimum of three different satellites, a GPS receiver can calculate a 2D (two-dimensional) positional fix, consisting of your latitude and longitude.

II. OBJECTIVE OF PROJECT

[1] To monitor and Vehicle track using Global Positioning System and to inform the authorities in case of accident.

III. METHODOLOGY

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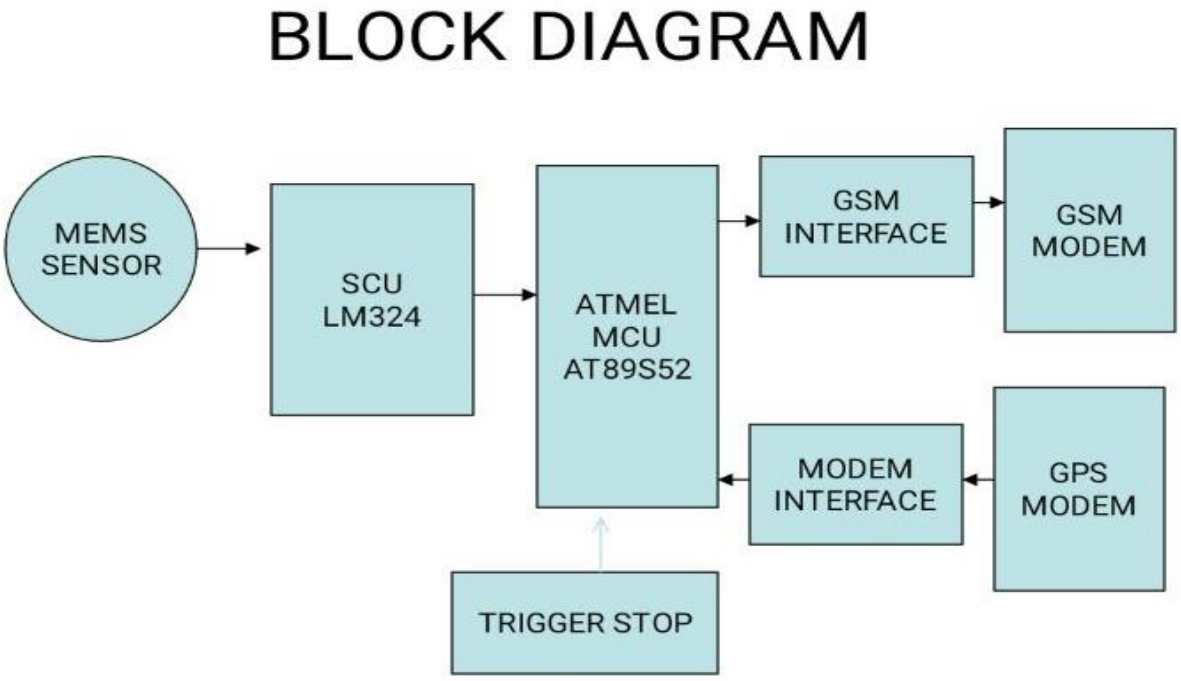
IV.EXPERIMENTAL SETUP



CAPACITIVE MEMS SENSOR

This model has sensitivity of 20 mV/g for an operational range of (0-50)g.In modern design they have proposed an MEMS capacitive accelerometer with fully symmetrical double side H-shaped beam, of which the sensitivity of the device is 0.24V/g with non-linearity of 0.29% over the range of (0-1)**g.**

ATMEL

The AT89S52 is a low-power, high-performance cmos 8-bit microcontroller with 8k bytes of in-system programmable Flash memory. Atmel 89S52 is a powerful microcontroller which provides a highly-flexible and cost-effective solution to many embedded control applications.The device is manufactured using Atmel's high-density nonvolatile memory technology and is compatible with the industry-standard instruction.

GSM MODULE

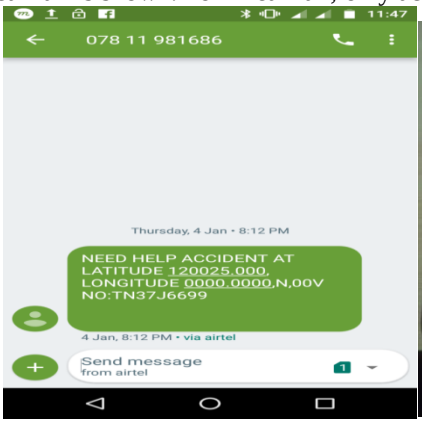
Global System for Mobile communication is used to send or receive messages to the registered mobile numbers.Simcom offers this information as a service to its customers, to support application and engineering efforts that use Simcom products.

GPS

GPS stands for Global Positioning System, and is a way of locating a receiver in three dimensional space anywhere on the Earth, and even in orbit about it.

IV. RESULT

The scenarios of fall or accident in motorcycle are mainly divided into two groups including fall by themselves and crash by other objects. Thus, the device may be tested with a limited number of situations of accidents. The motorcycle fall detection using MEMS accelerometer has been implemented and tested by using bicycle instead of motorcycle because it is less dangerous and the basic structure is like motorcycle. However, some parameters such as mass of rider and motorcycle were ignored in this experiment. Typical data for motorcycle fall without external force or linear fall is shown. For linear fall, only acceleration on z-coordinate is used to determine the accident.



V. CONCLUSION

In conclusion, an innovative wireless black box using MEMS accelerometer and GPS tracking system has been developed for motorcycle accidental monitoring. The system can detect type of accident (linear and nonlinear fall) from accelerometer signal using threshold algorithm, posture after crashing of motorcycle and GPS ground speed. After accident is detected, short alarm massage data (alarm massage and position of accident) will be sent via GSM network. The system has been tested in real world applications using bicycles. The test results show that it can detect linear fall, non-linear fall and nonnal ride with no false alarm.

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