Monitoring and tracking of radioactive elements to resist theft based on ARM 7

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ABSTRACT:

This paper deals with the need of monitoring and tracking of radioactive elements like missiles, RDX, bombs. It is mainly consists of two sections one is monitoring section for monitoring and the other one is tracking section for tracking. The tracking section is fixed to radioactive elements and monitoring section monitors the radioactive elements. The monitoring and tracking section's contains mems. The mems in monitor section is placed under the radioactive element. Both MEMS are used for sense the illegal movements. If there is a illegal movements the mems in monitoring section sense the illegal movements the dc motor closes doors of the room, The MEMS in tracking section also sense the illegal movement then gps and gsm find's it's geographical location and send's to gsm in monitoring section continuously . If the missing radioactive is in centre of the street there is a life threat to public. It is not possible the concern department can reach that place quickly. So they need a rapid movement to alert the public. In order to overcome this problem the alarm will be generated in tracking section with the help of gsm in monitoring section. This alarming will helps to alert the people.

Keywords: MEMS, GSM, GPS, DC MOTOR, BUZZER.

1. INTRODUCTION

An Introduction to MEMS (Micro-electromechanical Systems) MEMS has been identified as one of the most promising technologies for the 21st Century and has the potential to revolutionize both industrial and consumer products by combining silicon-based microelectronics with micromachining technology. MEMS, with emphasis on its commercial applications and device fabrication methods. It also describes the range of MEMS sensors and actuators, the phenomena that can be sensed or acted upon with MEMS devices, and outlines the major challenges facing the industry. Two MEMS are used in this design one is attached to monitoring section which is kept under radioactive elements and another MEMS is attached to tracking section

Generally people use and store regular goods, some regular goods may contains dangerous goods like radioactive elements (i.e missiles, RDX, bombs etc). If these goods are missed or stolen then there is a life threat to public. There is a need of identifying the missing or thefting of radioactive elements. So to overcome this problem a monitoring and tracking device is needed.

The designing of monitoring and tracking of radioactive elements contains two sections that is monitoring section and tracking section. The monitoring sections continuously checks whether for illegal movements. The tracking section is connected to radioactive elements and it is used for the tracking the missing or thefting of radioactive elements. The mems in monitoring section is placed under radioactive element and another mems is attached to tracking section. Both mems sense illegal movement. If the theft is done the MEMS under the radioactive element and MEMS in tracking section sense the illegal movement's then dc motor closes the doors of the room. GPS in tracking section will find its geographical location and ARM CONTROLLER will send these information continuously for every 2 seconds to monitoring section by using GSM technology .Here the key factor of this design is ARM7. If the missing radioactive element is placed centre of the city, it is not possible the concern department will reach that place immediately. This missing radioactive element leads a life threat to public. In order to overcome this problem a buzzer will be generated in tracking section by using gsm in monitoring section. The gsm in monitoring section will send a buzzer message to gsm in tracking section, if the buzzer message will received the ARM 7processor will ON the buzzer. This buzzer will be generated in tracking section which is connected to radioactive elements.

II.MONITORING SECTION

The control centre of this section is MICRO CONTROLLER UNIT (MCU). The type of MCU is ARM 7 LPC 2148 which consists of power supply, mems, keypad, dc motor, lcd screen and gsm.
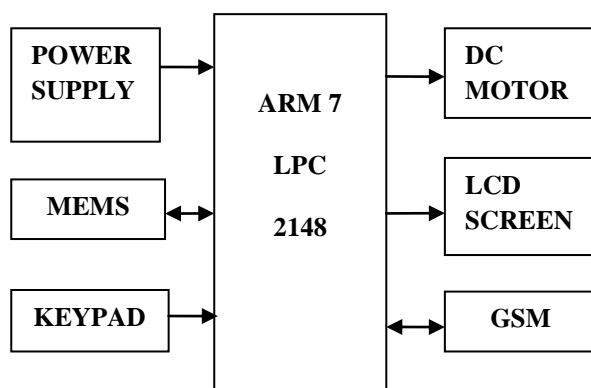

Figure 1: monitoring section

Lpc 2148 is a tiny LQFP64 package with 40 kb on-chip SRAM, 512 kb on-chip flash memory, 128 bit wide interface, speed of operation 60 MHZ, ISP/IAP erase in 400 ms and programming of 256 bytes in 1 ms, one USB 2.0 with 8 Kb of on-chip RAM accessible to USB by DMA, two 10-bit A/D convertor with 2.44 μs/channel, one 10-bit D/A converters, two 32-bit timers/external event counters, RTC with 32KHZ clock input, 2 I^2C of 400 Kbit/s, 45 of 5V fast GPIO, 9 edge or level sensitive external interrupt pins, 60 MHZ on-chip PLL with settling time of 100 μs, external crystal range from 1 MHZ to 30 MHZ, power saving mode, POR and BOD circuit operating voltage 3.3 V ± 10% with 5v tolerant.

MEMS means Micro-electromechanical systems. It is a process technology used to create tiny integrated devices or systems that combine mechanical and electrical components. They are fabricated using integrated circuit (IC) batch processing techniques and can range in size from a few micrometers to millimeters. These devices (or systems) have the ability to sense, control and actuate on the micro scale, and generate effects on the macro scale.

Power supply is generally 3.3 v to 5.0 v is required to use ARM 7 MICROCONTROLLER. KEYPAD is taken input to the processor. LCD screen 2X16 is used for display purpose.

GSM (Global System for Mobile Communication) use a Siemens TC35I module, link with the serial ports. GSM has become leading global mobile standard, spanning 218 countries. GSM is an open, digital cellular technology used for transmitting mobile voice and data services. This module's operating voltage is 3.3-5.5V, can work in both 900MHz and 1800MHz frequency bands. Power consumption of the two bands were 2W (900M) and 1W (1800M). The module has a set of AT commands interface, support the text and PDU mode short message, Type II fax of the third group, and 2.4k, 4.8k and 9.6k non-transparent mode.

DC motor can operate directly from rechargeable batteries, providing the motive power. In this the magnets are stationary ,when a conductor having dc current is placed between these magnets an Lorentz force generated. The working principle behind any DC motor is the attraction and repulsion of magnets. The simplest motors use electromagnets on a shaft, with permanent magnets in the case of the motor that attract and repel the electromagnets. The reason for using electromagnets is so that it is possible to flip their magnetic field (their north and south poles).
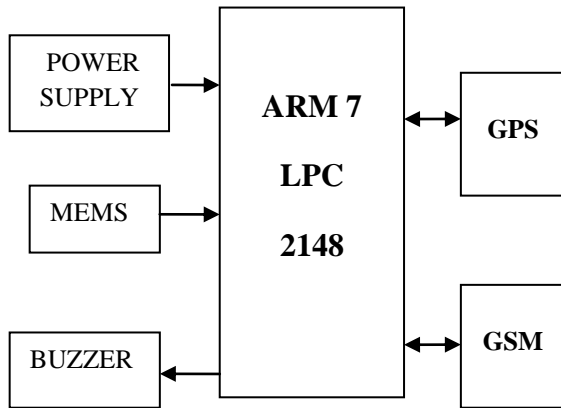
III.TRACKING SECTION

Figure 2: Tracking section

Tracking section is attached to radio active elements like missiles, RDX, bombs. This tracking section is mainly composed of 5 parts. Figure 3 shows the block diagram of tracking circuit. Power supply of this tracking section is 3.3v to 5.0 v. Generally a 3.3 v battery is enough to drive the device.

MEMS is used to sense the illegal movement. The MEMS in monitoring section is placed under the radio active elements where as the MENS in tracking section also sense the illegal movement and it will a send start command to processor then only gps and gsm will start finding geographical location and send this information to gsm in monitoring section.

GPS (Global Positioning System) uses SR-92, start time is short, find information quickly and, do not need to add another receiver antenna, small size. Wide power supply range3.3V - 5.5V, a spare battery and only5 external pins. The part of the circuit completed tracking, lock and measure for a GPS satellite signal, then generate data for calculating the location(Including: latitude, longitude, altitude, speed, date, time, heading, satellite status, etc). Data update rate is once per second.

BUZZER is helpful to alert the public. When a missing or thefting radioactive element is placed centre of the city or near shopping malls then there is a life threat to public. So, in order to overcome this problem gsm in monitoring section send a buzzer message to gsm in tracking section. After receiving the message or call Processor in tracking section will ON the buzzer.

SOFTWARE SECTION:

The designing software uses modular, structural design methods. These devices are having high reliability, it is easy to improve and upgrade at any instant. The entire design is based on mems sensor's for checking illegal movement, gps for finding geographical location, gsm for communication
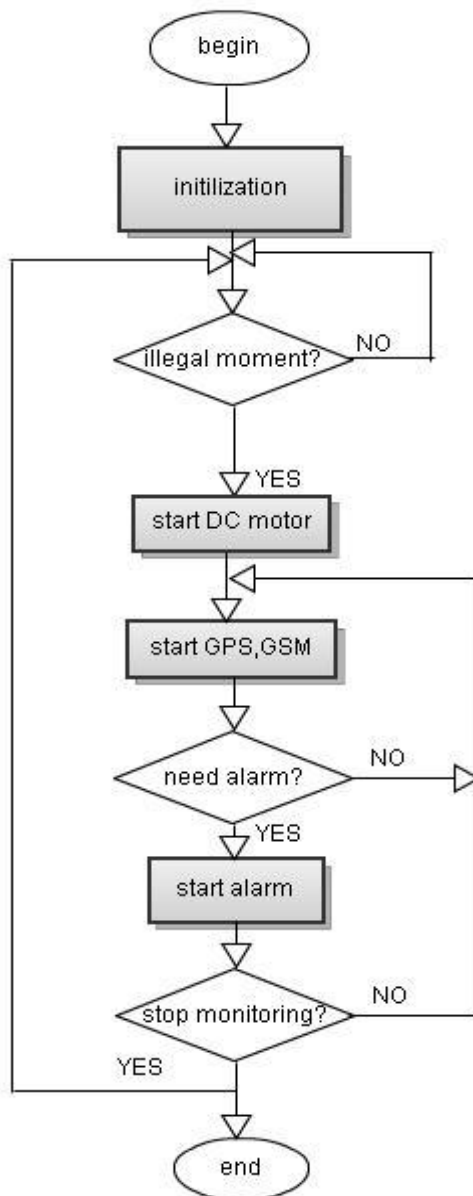

Figure 3: software design

The monitoring section is primarily used for input and tracking section is attached to the radioactive elements. After the power is ON ARM 7 guides all the peripherals and function circuits into the initialization state of the program. If we want to change the system parameters, you can carry out with buttons and menu options, the system has objective management, buzzer call, run menu item.

If there is a power on reset the tracking section goes into stand by. After receiving start up command ID+ start that system the mems in monitor section checks for any illegal movement continuously. These mems sensor provides monitoring works well. If there is a illegal movement or thefting mems in monitoring section which is under radioactive element sense the illegal movement the dc motor closes the doors of the room. The mems in tracking section also sense the illegal movement and tracking section will starts, the gsm mobile communication module and the gps positioning module transmitted current gps effective geographical information by text message, to locate and track positioning for the radioactive elements. If the missing radioactive element is in a main centre of the city or near shopping malls there is a life threat to public in order to alert the public a buzzer will be generated in tracking section by using gsm mobile communication.

V. CONCLUSION AND FUTURE WORKS

The monitoring and tracking of radioactive elements like missiles, RDX, bombs is designed and implemented based on ARM controller. Generally these design is useful in military field where large amount of radioactive sources is stored. It is not only monitoring and tracking the radioactive elements but also a buzzer will be generated to alert the people. This buzzer is useful to prevent the life threat to public against missed radioactive elements. This method will help to prevent misuse and reuse of radioactive elements. By using gsm technology the communication is possible between monitoring section and tracking section world widely.

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