



FALL ALARM AND INACTIVITY DETECTION SYSTEM DESIGN AND IMPLEMENTATION ON RASPBERRY PI

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ABSTRACT :In this project, a fall alarm and detection system is implemented on Raspberry Pi for security surveillance of empty-nesters in real time environment. We propose a novel method for fall alarm with a small amount of computing and we also present an inactivity detection method which we named “inactivity history” method to improve the accuracy of detection and it is a kind of adaptive method so it works well in even different environments. For fall alarm, we used one MEMS accelerometer sensor for detecting the persons moments in all directions, whenever the person has fallen then this system immediately capture the image and send to the preloaded emails. This system mainly have two sections one part have MEMS accelerometer sensor, RF Transmitter, GSM, Arduino microcontroller which is attached to the person body, 2nd part having RF Rx wireless module, Raspberry Pi ARM11 Processor, USB Camera, Buzzer alarm with internet. First transmitter section, continuously monitor the MEMS ADC values and send to

microcontroller, so that microcontroller unit can easily identify when the person falling ,sitting, walking conditions and send continuous signal to receiver unit which is placed at control unit. Once the alert signal is getting from the transmitter unit the raspberry pi immediately trigger the camera and send captured image to the respective email id’s. There are also E-mail and SMS warning functionalities, providing a very good safeguard for the elderly. Meanwhile, terminal device have advantages of small size and low power consumption, which will lead to wide applications. The system satisfies real-time and reliable requirements. Extensive experiments carried out demonstrate the effectiveness of our system. This entire control unit has designed with the help of Raspberry Pi (ARM1176JZF processor) and Arduino Uno (Atmega328 microcontroller). The Raspberry Pi processor is programmed using embedded c on Linux OS.



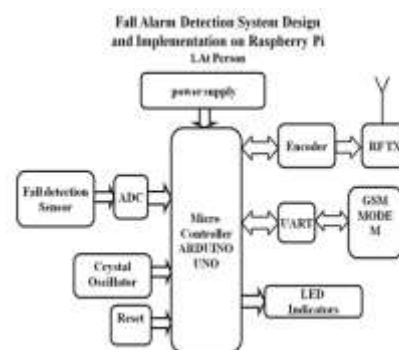
INTRODUCTION: In this task, a fall alarm and detection system is executed on Raspberry Pi for security reconnaissance of discharge nesters progressively condition. We propose a novel technique for fall alarm with a little measure of processing and we likewise display an inertia detection strategy which we named "dormancy history" technique to enhance the precision of detection and it is a sort of versatile technique so it functions admirably in even unique conditions. For fall alarm, we utilized one MEMS accelerometer sensor for distinguishing the people minutes every which way, at whatever point the individual has fallen then this system quickly catch the picture and send to the preloaded messages.

This system primarily have two areas one chapter have MEMS accelerometer sensor, RF Transmitter, GSM, Arduino microcontroller which is joined to the individual body, 2nd chapter having RF Rx remote module, Raspberry Pi ARM11 Processor, USB Camera, Buzzer alarm with web. To begin with transmitter area, continuously screen the MEMS ADC esteems and send to microcontroller, so microcontroller unit can without much of a stretch distinguish when the individual falling, sitting, strolling conditions and send persistent flag to recipient unit which is set at control unit. Once the ready flag is getting from the transmitter unit the raspberry pi instantly trigger

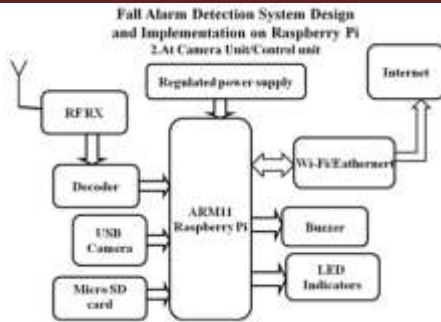
the camera and send caught picture to the individual email ids. There are additionally E-mail and SMS cautioning functionalities, giving a decent defend to the elderly. In the interim, terminal gadget have focal points of little size and low power utilization, which will prompt wide applications. The system fulfills continuous and dependable prerequisites. Broad investigations completed exhibit the viability of our system. This whole control unit has composed with the assistance of Raspberry Pi (ARM1176JZF processor) and Arduino Uno (Atmega328 microcontroller). The Raspberry Pi processor is customized utilizing inserted c on Linux OS. Raspberry Pi processor is programmed using embedded 'Linux'.

HARDWARE IMPLEMENTATION:

TRANSMITTER:



RECEIVER:



ARM PROCESSOR

- ARM Processor was created at Acorn PC restricted of Cambridge, England in the vicinity of 1983 and 1985.
- This was after RISC idea turned out at Stanford and Berkeley colleges in 1980.
- ARM utilizes Enhanced RISC Architecture.
- ARM (Acorn RISC machine) constrained was found in 1990.
- ARM outlined essential center structure and authorized it to numerous chapterners who create and manufacture new Micro Controllers and distinctive chips.
- ARM processor is primarily expected in the improvement of inserted applications which include complex calculations (High-end applications).

ARM ARCHITECTURE

- ARM design depends on Enhanced RISC engineering (goes astray from great RISC design).
- Embedded applications need:
 - High code thickness
 - Low control utilization rate
 - Small silicon impression

- A extensive uniform enroll document (bank).
- Load-Store design, where information preparing operations include just registers yet not memory areas.
- Uniform and Fixed length directions.
- Good speed/control utilization proportion.
- High code thickness.

RASPBERRY PI :The Raspberry Pi is a charge card estimated single-board PC created in the UK by the Raspberry Pi Foundation with the goal of advancing the instructing of essential software engineering in schools. The Raspberry Pi is made through approved gathering oversees Newark element14 (Premier Farnell), RS Components and Egoman. These associations offer the Raspberry Pi on the web. Egoman produces an adjustment for allotment solely in China and Taiwan, which can be perceived from various Pis by their red shading and nonappearance of FCC/CE checks. The hardware is the same over all creators. The Raspberry Pi has a Broadcom BCM2835 system on a chip (SoC), which incorporates an ARM1176JZF-S 700 MHz processor (The firmware incorporates various "Turbo" modes so the client can endeavor over timing, up to 1 GHz, without influencing the guarantee), VideoCore IV GPU, and was initially sent with 256 megabytes of RAM, later moved up to 512 MB. It does exclude an implicit hard circle or strong state drive, yet utilizes a SD card for



booting and long haul stockpiling. The Foundation's objective was to offer two variants, valued at US\$25 and US\$35. They began tolerating orders for the higher evaluated show B on 29 February 2012, and the lower cost demonstrate An on 4 February 2013. Notwithstanding the recognizable USB, Ethernet and HDMI ports, the R-Pi offers bring down level interfaces planned to associate all the more straightforwardly with chips and subsystem modules. These GPIO (universally useful I/O) motions on the 2x13 header pins incorporate SPI, I2C, serial UART, 3V3 and 5V control. These interfaces are not "attachment and play" and expect care to abstain from miswiring. The pins utilize a 3V3 rationale level and are not tolerant of 5V levels, for example, you may discover on a 5V fueled Arduino. CSI (camera serial interface) can be utilized to associate the 5 MP camera accessible. Not yet programming empowered is the flex link connectors with DSI (show serial interface) and a serial connection inside the HDMI connector called CEC. (purchaser gadgets control) The Foundation gives Debian and Arch Linux ARM appropriations for download. Devices are accessible for Python as the principle programming dialect, with help for BBC BASIC (by means of the RISC OS picture or the "Schnaps Basic" clone for Linux), C, and Perl. On 17 December 2012 the Raspberry Pi Foundation, in a joint effort with IndieCity and

Velocix, opened the "Pi Store", as a "one-stop look for all your Raspberry Pi (programming) needs". Utilizing an application incorporated into Raspbian, clients can peruse through a few classifications and download what they need. Programming can likewise be transferred for control and discharge In October 2013 the Foundation declared that the one millionth Pi had been fabricated in the United Kingdom In November 2013 they declared that the two millionth Pi sent between October 24 and October 31st In 2006, early ideas of the Raspberry Pi depended on the Atmel ATmega644 microcontroller. Its schematics and PCB design are accessible for open download. Establishment trustee Eben Upton amassed a gathering of instructors, scholastics and PC lovers to devise a PC to inspire youngsters. The PC is inspired by Acorn's BBC Micro of 1981. The primary ARM model adaptation of the PC was mounted in a bundle an indistinguishable size from a USB memory stick. It had a USB port toward one side and a HDMI port on the other.

ARDUINO: The Arduino is a group of microcontroller sheets to improve electronic plan, prototyping and testing for craftsmen, programmers, specialists, yet in addition numerous experts. Individuals utilize it as brains for their robots, to assemble new advanced music instruments, or to manufacture a system



that lets your home plants tweet you when they're dry. Arduinos (we utilize the standard Arduino Uno) are worked around an ATmega microcontroller — basically an entire PC with CPU, RAM, Flash memory, and information/yield pins, all on a solitary chip. Not at all like, say, a Raspberry Pi, it's intended to connect a wide range of sensors, LEDs, little engines and speakers, servos, and so forth straightforwardly to these pins, which can read in or yield advanced or simple voltages in the vicinity of 0 and 5 volts. The Arduino interfaces with your PC by means of USB, where you program it in a basic dialect (C/C++, like Java) from inside the free Arduino IDE by transferring your compiled code to the board. Once customized, the Arduino can keep running with the USB connect back to your PC, or remain solitary without it — no console or screen required, simply control.

WEB CAMERA: A webcam is a camcorder that sustains its picture continuously to a PC or PC organize. Not at all like an IP camera (which utilizes an immediate association utilizing ethernet or Wi-Fi), a webcam is for the most part associated by a USB link, FireWire link, or comparative link.

Their most prominent utilize is the foundation of video joins, allowing PCs to go about as videophones or videoconference stations. The

normal use as a camcorder for the World Wide Web gave the webcam its name. Other mainstream utilizes incorporate security reconnaissance, PC vision, video broadcasting, and for recording social recordings. Webcams are known for their low assembling expense and adaptability, making them the least cost type of video communication. They have additionally turned into a wellspring of security and protection issues, as some inherent webcams can be remotely enacted through spyware. The camera board is an awesome item, and no uncertainty will show signs of improvement as the product develops, however in light of your prerequisites, may or not be the best decision.

MEMS sensor MMA 7260 Q:

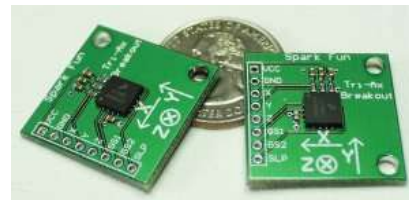


Fig MEMS sensor MMA7260Q

The MMA7260Q is a 3-hub accelerometer .An accelerometer measures increasing speed (change in speed) of anything that it's mounted on. Single pivot accelerometers measure increasing speed in just a single bearing. Double pivot accelerometers are the most well-known measure speeding up in two ways, opposite to each other. Three-pivot accelerometers measure



increasing speed in three ways. Accelerometers are extremely helpful for measuring the introduction of a protest with respect to the earth, since gravity makes all articles quicken towards the earth. A two-hub accelerometer can be utilized to gauge how level a question is. (This would be a decent place to fill in conditions to compute a body's point from the X and Y increasing velocities on the body). With a three-pivot accelerometer, you can gauge a protest's speeding up toward each path.

Buzzer

Essentially, the sound wellspring of a piezoelectric sound part is a piezoelectric stomach. A piezoelectric stomach comprises of a piezoelectric earthenware plate which has anodes on the two sides and a metal plate (metal or stainless steel, and so forth.). A piezoelectric clay plate is appended to a metal plate with cements. Applying D.C. voltage between anodes of a piezoelectric stomach causes mechanical mutilation because of the piezoelectric impact. For a deformed piezoelectric component, the bending of the piezoelectric component extends an outspread way. Furthermore, the piezoelectric stomach twists toward the heading. The metal plate clung to the piezoelectric component does not grow. On the other hand, when the piezoelectric component contracts, the piezoelectric stomach twists toward the path

Thus, when AC voltage is connected crosswise over terminals, the bowing is rehashed, creating sound waves noticeable all around.

CONCLUSION: Incorporating highlights of all the equipment segments utilized have been produced in it. Nearness of each module has been contemplated out and set precisely, in this manner adding to the best working of the unit. Besides, utilizing exceptionally propelled IC's with the assistance of developing innovation, the undertaking has been effectively executed. In this manner the task has been effectively composed and tried.

FUTURE SCOPE: Our venture "Fall Alarm Detection System Design and Implementation on Raspberry Pi" is for the most part expected to outline a system which gives the high security based observing and ready system. The undertaking "Fall Alarm Detection System Design and Implementation on Raspberry Pi" utilizing ARM-11 processor and AVR controller is a restrictive task which can give high security through online caution IOT(Internet of things).This system ceaselessly checking the people inside the room or outside utilizing sensor and camera .If any case individual has fallen all of a sudden this system caught the picture and send to the email caution and furthermore send ready message to the individual numbers utilizing GSM This venture



can be broadened utilizing high proficiency GPS beneficiary and interfacing to cctv system. With the goal that we can screen indoor and open air system effortlessly and furthermore this will be exceptionally useful to find the correct area for hospitals and others.

REFERENCES

1. Hong Lu, "The influence of aging population on China's economy in the information society", *ICIME*, pp. 264-267, 2010
2. Chankyu Park, Jaehong Kim, Choi Ho-Jin, "A Watch-type Human Activity Detector for the Aged Care", *ICACT*, pp. 648-652, 2012
3. Garripoli Carmine et al., "Embedded DSP-based telehealth radar system for remote in-door fall detection", *IEEE Journal of Biomedical and Health Informatics*, vol. 19, pp. 92-101, Jan. 2015.
4. <http://openrelief.org/>
5. http://www.theregister.co.uk/2012/06/12/raspberry_pi_drone/
6. <http://www.zdnet.com/raspberry-pi-planner-clues-at-future-rendition-4010025712/>
7. <http://janbierens.com/2012/05/22/raspberry-pi-and-what's-to-come/>
8. [http://www.pcpro.co.uk/surveys/desktops/374290/raspberry-pi-display b](http://www.pcpro.co.uk/surveys/desktops/374290/raspberry-pi-display-b)
9. [http://www.techrepublic.com/blog/european-innovation/raspberry-pi-five-ways-business-can-utilize it/610](http://www.techrepublic.com/blog/european-innovation/raspberry-pi-five-ways-business-can-utilize-it/610)