WOMEN'S SAFETY SYSTEM USING RASPBERRY PI

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ABSTRACT

This project describes about a smart intelligent security system for women. Women all over the world are facing much unethical physical harassment. This acquires a fast pace due to lack of a suitable surveillance system. Our project is a venture to resolve this problem. We are using two objects wrist band and spectacles that are used in day to day life. The system resembles a band on the wrist incorporated with pressure switch as an input which when activates shows the result Screaming alarm and tear gas mechanism are imposed for self-defensing purpose and send location and messages to the emergency contacts and also figure out the attacker using live streaming video. Tear gas mechanism and live streaming video using webcam is incorporated in the spectacles that act as a weapon of the smart technology. We really believe that this endeavor will make a difference in the women life.

Key words: Women Security, Live Streaming Video, GSM, GPS, ARMV7-A, Raspberry pi 2.

I.INTRODUCTION

The status of women in India has gone through many great changes over the past few millennia. In modern India, women continue to face social challenges and are often victims of abuse and violent crimes and, according to a global poll conducted by Thomson Reuters, India is the "fourth most dangerous country" in the world for women, and the worst country for women among the G20 countries. This project focuses on a security system that is designed solely to serve the purpose of providing security and safety to women so that they never feel helpless while facing such social challenges. The Delhi "Nirbhaya" case that triggered the whole nation was the greatest motivation for this project. It was high time we women needed a change.

II. PROPOSED METHOD

The proposed system is to design a portable device which resembles a band on wrist. It consists of Pressure switch, Raspberry pi 2, GSM modem, GPS receiver, Screaming alarm, Tear gas, and Live Steaming Video. When the Pressure switch is pressed, the device will get activated automatically with in a fraction of milliseconds. Immediately the location of the victim will be tracked and messages will be sent to emergency Smart Intelligent Security System for Women
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contacts. The screaming alarm unit will be activated and will produce siren sound to call out for help. Tear gas is applied to harm the attacker which may help the victim to escape. Live Streaming Video will make to process the situation of the victim using a preferred IP address so that it help to detects the face of the attacker along with the surrounding environment that helps to figure out easily..

Tear gas release and Live streaming video using webcam are incorporated in the spectacles which act as a new weapon for smart technology.

III. EXISTING SYSTEMS

While referring keeping the same concern in mind many developers have come up with innovative applications. Major existing applications are-

A. VithU app

This is an emergency app initiated by a popular Indian crime television series "Gumrah" aired on Channel [V]. VithU, is an emergency App that, at the click of the power button of your Smartphone 2 times consecutively begins sending out alert messages every 2 minutes to your contacts that you feed into the app as the designated receivers or guardians. The message says "I am in danger. I need help. Please follow my location."

B. The stun gun

This small gun charges an attacker with an electric shock. The shock weakens the attacker temporarily, giving you sample chance to escape the scene. When its trigger is pulled, a stun gun pumps about 700,000 volts into the attacker's body. Some stun guns are small enough to be concealed in a pack of cigarettes. They run on Lithium batteries and can be carried either in handbags or held in waist straps.

C. Fight back

FightBack app is a very basic app similar to ones listed above. However, one unique feature we like about the app is the Facebook status update. Apart from providing SMS and Email options to alert the other person during distress, this app also updates your Facebook status.

IV. METHODOLOGY

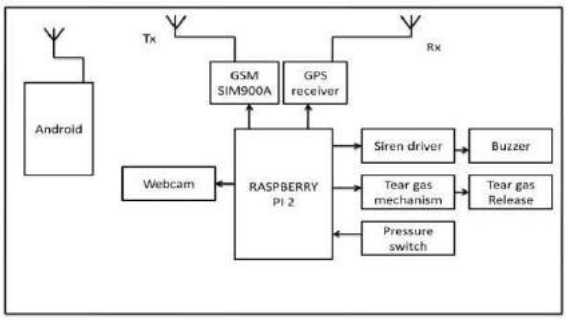


Figure shows the methodology the system

A. Raspberry pi 2

The Raspberry Pi is a series of credit card–sized single-board computers developed in the United Kingdom by the Raspberry Pi Foundation with the intention of promoting the teaching of basic computer science in schools and developing countries. The Raspberry Pi 2 is based on the Broadcom BCM2836system on a chip (So C), which includes an ARMcortexv7 900mhz processor, Video Core IV GPU, and was originally shipped with 256 megabytes of RAM. As of 8 June 2015, about five to six million Raspberry Pi's have been sold. The Raspberry Pi 2, was released in February 2015.

B.GSM SIM900A

A GSM modem is a specialized type of modem which accepts a SIM card, and operates over a subscription to a mobile operator, just like a mobile phone. From the mobile operator perspective, a GSM modem looks just like a mobile phone. When a GSM modem is connected to a computer, this allows the computer to use the GSM modem to communicate over the mobile network. While these GSM modems are most frequently used to provide mobile internet connectivity, many of them can also be used for sending and receiving SMS and MMS messages. Mobile services based on GSM technology were first launched in Finland in 1991. The SIM900A is

a complete Dual-band GSM/GPRS module in a SMT type which is designed especially for Chinese market, allowing you to benefit from small dimensions and cost-effective solutions. Featuring an industry-standard interface, the SIM900A delivers GSM/GPRS 900/1800MHz performance for voice, SMS, Data, and Fax in a small form factor and with low power consumption. With a tiny configuration of 24mm x 24mm x 3 mm, SIM900A can fit almost all the space requirements in your applications, especially for slim and compact demand of design.

C. GPS Receiver

GPS Module continuously receives the data from the satellite and transmits correspondingly to the RS232. It is developed by US department of defense (DOD).The GPS signal is applied to the antenna input of module, and a complete serial data message with position, velocity and time information is presented at the serial interface. The current date, time, longitude, latitude, altitude, speed, and travel direction among other data, are provided by the module and can be used in a many applications including navigation, fleet management, tracking systems, mapping and robotics. The module can support up to 51 channels. The GPS solution enables small form factor devices which deliver major advancements in GPS performances, accuracy, integration, computing power and flexibility. They are used to simplify the embedded system integration process.

D. Live Streaming Video

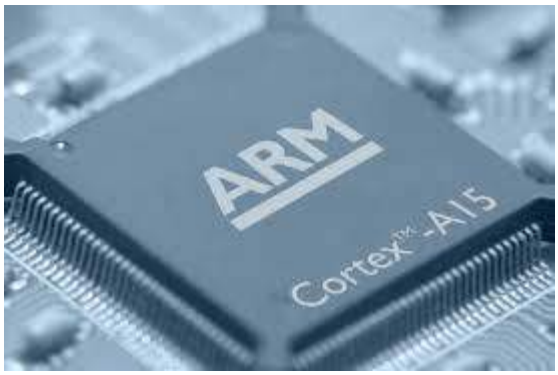
By configuring the wi-fi,we get a ip adress. Using Logitech c270 webcam,by installing the motion software in Raspberry pi 2 model B. We can see the live streaming video or else we can save the video for the recording purpose and capture the image of the attacker.finally we can put him behind the bars.

E.Extra features

A DC 3V motor pump for the tear gas mechanism is used which can be incorporated on the one side of the spectacles. This will harm the attacker, when it is sprayed in the eyes. For Screaming Alarm,we are using the electromagnetic 3V buzzer to call out for help. all these mechanisms work when pressure switch pressend which is located in the wrist band.

ARM Processor:

An ARM processor is one of a family of CPUs based on the RISC (reduced instruction set computer) architecture developed by Advanced RISC Machines (ARM). ARM makes 32-bit and 64-bit RISC multi-core processors. RISC processors are designed to perform a smaller number of types of computer instructions so that they can operate at a higher speed, performing more millions of instructions per second (MIPS). The ARM processor’s smaller size, reduced complexity and lower power consumption makes them suitable for increasingly miniaturized devices. ARM is the industry's leading supplier of microprocessor technology, offering the widest range of microprocessor cores to address the performance, power and cost requirements for almost all application markets. Combining a vibrant ecosystem with over 1,000 partners delivering silicon, development tools and software, and more than 50 billion processors sold, ARM truly is “The Architecture for the Digital World.



ARM, originally **Acorn RISC Machine**, later **Advanced RISC Machine**, is a family of reduced instruction set computing (RISC) architectures for computer processors, configured for various environments. British company ARM Holdings develops the architecture and licenses it to other companies, who design their own products that implement one of those architectures including systems-on-chips (SoC) that incorporate memory, interfaces, radios, etc. It also designs cores that implement this instruction set and licenses these designs to a number of companies that incorporate those core designs into their own products.

A RISC-based computer design approach means processors require fewertransistors than typical complex instruction set computing (CISC) x86processors in most personal computers. This approach reduces costs, heat and power use. Such reductions are desirable traits for light, portable, battery-powered devices including smartphones, laptops and tablet computers, and other embedded systems. For Supercomputers, which consume large amounts of electricity, ARM could also be a power-efficient solution.

The company periodically releases updates to its cores. All cores from ARM Holdings support a 32-bit address space (only pre-ARMv3 chips, as in originalAcorn Archimedes, had smaller) and 32-bit arithmetic; the ARMv8-A architecture, announced in October 2011, adds support for a 64-bit address space and 64-bit arithmetic. Instructions for ARM Holdings' cores have 32-bit fixed-length instructions, but later versions of the architecture also support a variable-length instruction set that provides both 32- and 16-bit instructions for improved code density. Some cores can also provide hardware execution ofJava bytecodes. With over 50 billion ARM processors produced as of 2014, ARM is the most widely used instruction set architecture in terms of quantity produced. Currently, the widely used Cortex cores, older "classic" cores, and specialized SecurCore cores variants are available for each of these to include or exclude optional capabilities.

ARM Holdings' primary business is selling IP cores, which licensees use to createmicrocontrollers (MCUs), CPUs, and systems-on-chips based on those cores. Theoriginal design manufacturer combines the ARM core with other parts to produce a complete device, typically one that can be built in existing semiconductor fabs at low cost and still deliver substantial performance. The most successful implementation has been the ARM7TDMI with hundreds of millions sold. Atmel has been a precursor design center in the ARM7TDMI-based embedded system.

The ARM architectures used in smartphones, PDAs and other mobile devices range from ARMv5 to ARMv6, used in low-end devices, to ARMv7-A used in current high-end devices. ARMv7 includes a hardware floating-point unit (FPU), with improved speed compared to software-based floating-point.

In 2009, some manufacturers introduced netbooks based on ARM architecture CPUs, in direct competition with netbooks based on Intel Atom. According to analyst firm IHS iSuppli, by 2015, ARM ICs may be in 23% of all laptops.

ARM Holdings offers a variety of licensing terms, varying in cost and deliverables. ARM Holdings provides to all licensees an integratable hardware description of the ARM core as well as complete software development toolset (compiler,debugger, software development kit) and the right to sell manufactured silicon containing the ARM CPU.

SoC packages integrating ARM's core designs include Nvidia Tegra's first three generations, CSR plc's Quatro family, ST-Ericsson's Nova and NovaThor, Silicon Labs's Precision32 MCU, Texas Instruments's OMAP products, Samsung's Hummingbird and Exynos products, Apple's A4, A5, and A5X, and Freescale's i.MX. Fabless **licensees**, who wish to integrate an ARM core into their own chip design, are usually only interested in acquiring a ready-to-manufacture verified IP core. For these customers, ARM Holdings delivers a gate netlist description of the chosen ARM core, along with an abstracted simulation model and test programs to aid design integration and verification. More ambitious customers, including integrated device manufacturers (IDM) and foundry operators, choose to acquire the processor IP in synthesizable RTL (Verilog) form. With the synthesizable RTL, the customer has the ability to perform architectural level optimisations and extensions. This allows the designer to achieve exotic design goals not otherwise possible with an unmodified netlist (high clock speed, very low power consumption, instruction set extensions, etc.). While ARM Holdings does not grant the licensee the right to resell the ARM architecture itself, licensees may freely sell manufactured product such as chip devices, evaluation boards and complete systems. Merchant foundries can be a special case; not only are they allowed to sell finished silicon containing ARM cores, they generally hold the right to re-manufacture ARM cores for other customers.

ARM Holdings prices its IP based on perceived value. Lower performing ARM cores typically have lower licence costs than higher performing cores. In implementation terms, a synthesizable core costs more than a hard macro (blackbox) core. Complicating price matters, a merchant foundry that holds an ARM licence, such as Samsung or Fujitsu, can offer fab customers reduced licensing costs. In exchange for acquiring the ARM core through the foundry's in-house design services, the customer can reduce or eliminate payment of ARM's upfront licence fee.

Compared to dedicated semiconductor foundries (such as TSMC and UMC) without in-house design services, Fujitsu/Samsung charge two- to three-times more per manufactured wafer. For low to mid volume applications, a design service foundry offers lower overall pricing (through subsidisation of the licence fee). For high volume mass-produced parts, the long term cost reduction achievable through lower wafer pricing reduces the impact of ARM's NRE (Non-Recurring Engineering) costs, making the dedicated foundry a better choice.

Companies that have designed chips with ARM cores include Amazon.com's Annapurna Labs subsidiary, Analog Devices, Apple, AppliedMicro, Atmel, Broadcom, Cypress Semiconductor, Freescale Semiconductor

(now NXP Semiconductors), Nvidia, NXP, Qualcomm, Renesas, Samsung Electronics, ST Microelectronics and Texas Instruments.

CPU modes:

Except in the M-profile, the 32-bit ARM architecture specifies several CPU modes, depending on the implemented architecture features. At any moment in time, the CPU can be in only one mode, but it can switch modes due to external events (interrupts) or programmatically.

- *User mode:* The only non-privileged mode.
- *FIQ mode:* A privileged mode that is entered whenever the processor accepts an FIQ interrupt.
- *IRQ mode:* A privileged mode that is entered whenever the processor accepts an IRQ interrupt.
- *Supervisor (svc) mode:* A privileged mode entered whenever the CPU is reset or when an SVC instruction is executed.
- *Abort mode:* A privileged mode that is entered whenever a prefetch abort or data abort exception occurs.
- *Undefined mode:* A privileged mode that is entered whenever an undefined instruction exception occurs.
- *System mode (ARMv4 and above):* The only privileged mode that is not entered by an exception. It can only be entered by executing an instruction that explicitly writes to the mode bits of the CPSR.
- *Monitor mode (ARMv6 and ARMv7 Security Extensions, ARMv8 EL3):* A monitor mode is introduced to support TrustZone extension in ARM cores.
- *Hyp mode (ARMv7 Virtualization Extensions, ARMv8 EL2):* A hypervisor mode that supports Popek and Goldberg virtualization requirements for the non-secure operation of the CPU.
- *Thread mode (ARMv6-M, ARMv7-M, ARMv8-M):* A mode which can be specified as either privileged or unprivileged, while whether Main Stack Pointer (MSP) or Process Stack Pointer (PSP) is used can also be specified in CONTROL register with privileged access. This mode is designed for user tasks in RTOS environment but it's typically used in bare-metal for super-loop.
- *Handler mode (ARMv6-M, ARMv7-M, ARMv8-M):* A mode dedicated for exception handling (except the RESET which are handled in Thread mode). Handler mode always uses MSP and works in privileged level.

Instruction set:

The original (and subsequent) ARM implementation was hardwired without microcode, like the much simpler 8-bit 6502processor used in prior Acorn microcomputers.

The 32-bit ARM architecture (and the 64-bit architecture for the most part) includes the following RISC features:

- Load/store architecture.
- No support for unaligned memory accesses in the original version of the architecture. ARMv6 and later, except some microcontroller versions, support unaligned accesses for half-word and single-word load/store instructions with some limitations, such as no guaranteed atomicity.
- Uniform 16× 32-bit register file (including the program counter, stack pointer and the link register).

- Fixed instruction width of 32 bits to ease decoding and pipelining, at the cost of decreased code density. Later, theThumb instruction set added 16-bit instructions and increased code density.
- Mostly single clock-cycle execution.

To compensate for the simpler design, compared with processors like the Intel 80286 and Motorola 68020, some additional design features were used:

- Conditional execution of most instructions reduces branch overhead and compensates for the lack of a branch predictor.
- Arithmetic instructions alter condition codes only when desired.
- 32-bit barrel shifter can be used without performance penalty with most arithmetic instructions and address calculations.
- Has powerful indexed addressing modes.
- A link register supports fast leaf function calls.
- A simple, but fast, 2-priority-level interrupt subsystem has switched register banks.
- **Acorn RISC Machine: ARM2**
- The official Acorn RISC Machine project started in October 1983. They chose VLSI Technology as the silicon partner, as they were a source of ROMs and custom chips for Acorn. Wilson and Furber led the design. They implemented it with a similar efficiency ethos as the 6502. A key design goal was achieving low-latency input/output (interrupt) handling like the 6502. The 6502's memory access architecture had let developers produce fast machines without costly direct memory access hardware. The first samples of ARM silicon worked properly when first received and tested on 26 April 1985.
- The first ARM application was as a second processor for the BBC Micro, where it helped in developing simulation software to finish development of the support chips (VIDC, IOC, MEMC), and sped up the CAD software used in ARM2 development. Wilson subsequently rewrote BBC BASIC in ARM assembly language. The in-depth knowledge gained from designing the instruction set enabled the code to be very dense, making ARM BBC BASIC an extremely good test for any ARM emulator. The original aim of a principally ARM-based computer was achieved in 1987 with the release of the Acorn Archimedes. In 1992, Acorn once more won the Queen's Award for Technology for the ARM.
- The ARM2 featured a 32-bit data bus, 26-bit address space and 27 32-bit registers. Eight bits from the program counterregister were available for other purposes; the top six bits (available because of the 26-bit address space) served as status flags, and the bottom two bits (available because the program counter was always word-aligned) were used for setting modes. The address bus was extended to 32 bits in the ARM6, but program code still had to lie within the first 64 MB of memory in 26-bit compatibility mode, due to the reserved bits for the status flags. The ARM2 had a transistor count of just 30,000, compared to Motorola's six-year-older 68000 model with around 40,000. Much of this simplicity came from the lack of microcode (which represents about one-

quarter to one-third of the 68000) and from (like most CPUs of the day) not including any cache. This simplicity enabled low power consumption, yet better performance than the Intel 80286. A successor, ARM3, was produced with a 4 KB cache, which further improved performance.

RASPBERRY PI:

- The idea behind a tiny and affordable computer for kids came in 2006, when Eben Upton, Rob Mullins, Jack Lang and Alan Mycroft, based at the University of Cambridge‘s Computer Laboratory, became concerned about the year-on-year decline in the numbers and skills levels of the A Level students applying to read Computer Science. There was a situation where computers had become so expensive and kids couldn’t learn the programming and experimentation.

GPIO Overview:

General Purpose Input/Output pins on the Raspberry Pi

OVERVIEW:

This page expands on the technical features of the GPIO pins available on BCM2835 in general. For usage examples, see the GPIO Usage section. When reading this page, reference should be made to the BCM2835 ARM PeripheralsDatasheet, section 6.

GPIO pins can be configured as either general-purpose input, general-purpose output or as one of up to 6 special alternate settings, the functions of which are pin-dependant.

There are 3 GPIO banks on BCM2835.

Each of the 3 banks has its own VDD input pin. On Raspberry Pi, all GPIO banks are supplied from 3.3V. **Connection of a GPIO to a voltage higher than 3.3V will likely destroy the GPIO block within the SoC.**

A selection of pins from Bank 0 is available on the P1 header on Raspberry Pi.

GPIO PADS

The GPIO connections on the BCM2835 package are sometimes referred to in the peripherals datasheet as "pads" - a semiconductor design term meaning "chip connection to outside world".

The pads are configurable CMOS push-pull output drivers/input buffers. Register-based control settings are available for

- Internal pull-up / pull-down enable/disable
- Output drive strength
- Input Schmitt-trigger filtering

POWER-ON STATES

All GPIOs revert to general-purpose inputs on power-on reset. The default pull states are also applied, which are detailed in the alternate function table in the ARM peripherals datasheet. Most GPIOs have a default pull applied.

INTERRUPTS

Each GPIO pin, when configured as a general-purpose input, can be configured as an

interrupt source to the ARM. Several interrupt generation sources are configurable:

- Level-sensitive (high/low)
- Rising/falling edge
- Asynchronous rising/falling edge

Level interrupts maintain the interrupt status until the level has been cleared by system software (e.g. by servicing the attached peripheral generating the interrupt).

The normal rising/falling edge detection has a small amount of synchronisation built into the detection. At the system clock frequency, the pin is sampled with the criteria for generation of an interrupt being a stable transition within a 3-cycle window, i.e. a record of "1 0 0" or "0 1 1". Asynchronous detection bypasses this synchronisation to enable the detection of very narrow events. **INSTALLING OPERATING SYSTEM IMAGES USING WINDOWS:**

This resource explains how to install a Raspberry Pi operating system image on an SD card. You will need another computer with an SD card reader to install the image.

We recommend most users download NOOBS, which is designed to be very easy to use. However, more advanced users looking to install a particular image should use this guide.

Some basic guides to configuring your Raspberry Pi.

CONTENTS:

Raspi-config:

 The Raspberry Pi configuration tool in Raspbian, allowing you to easily enable features such as the camera, and change your specific settings such as keyboard layout.

Config.txt:

 The Raspberry Pi configuration file.

 Switch your audio output between HDMI and the 3.5mm jack.

Camera Config:

 Installing and setting up the Raspberry Pi camera board.

Localisation:

 Setting up your Pi to work in your local language/timezone.

Default pin configuration:

 Changing the default pin states.

Device Trees Config:

 Device Trees, overlays and parameters.

RASPBIAN OPERATING SYSTEM: Raspbian is the recommended operating system for normal use on a Raspberry Pi. Raspbian is a free operating system based on Debian, optimised for the Raspberry Pi hardware. Raspbian comes with over 35,000 packages: precompiled software bundled in a nice format for easy installation on your Raspberry Pi. Raspbian is a community project under active development, with an emphasis on improving the stability and performance of as many Debian packages as possible.

DOWNLOAD THE IMAGE:

Official images for recommended operating systems are available to download from the Raspberry Pi website Downloads page. Alternative distributions are available from third-party vendors. After downloading the .zip file, unzip it to get the image file (.img) for writing to your SD card.

- Insert the SD card into your SD card reader and check which drive letter was assigned. You can easily see the drive letter, such as G:, by looking in the left column of Windows Explorer. You can use the SD card slot if you have one, or a cheap SD adapter in a USB port.
- Download the Win32DiskImager utility from the Sourceforge Project page as a zip file; you can run this from a USB drive.
- Extract the executable from the zip file and run the Win32DiskImagerutility; you may need to run this as administrator. Right-click on the file, and select **Run as administrator**.
- Select the image file you extracted earlier.
- Select the drive letter of the SD card in the device box. Be careful to select the correct drive; if you get the wrong one you can destroy the data on your computer's hard disk! If you are using an SD card slot in your computer and can't see the drive in the Win32DiskImager window, try using an external SD adapter.
- Click Write and wait for the write to complete.
- Exit the imager and eject the SD card.

APT- Advanced Packaging Tool:

The easiest way to manage installing, upgrading, and removing software is using APT (Advanced Packaging Tool) which comes from Debian. If a piece of software is packaged in Debian and it works on the Raspberry Pi's ARM architecture, it should also be available in Raspbian. To install or remove packages you need root user permissions, so your user needs to be in **sudoers** or you must be logged in as **root**. Read more aboutusers and root.

To install new packages, or update existing ones, you will need an internet connection. Note that installing software uses up disk space on your SD card, so you should keep an eye on disk usage and use an appropriately sized SD card. Also note that a lock is performed while software is installing, so you cannot install multiple packages at the same time.

SOFTWARE SOURCES:

APT keeps a list of software sources on your Pi in a file at/etc/apt/sources.list. Before installing software, you should update your package list with apt-get update:

sudo apt-get update

INSTALLING A PACKAGE WITH APT

sudo apt-get install tree

Typing this command should inform the user how much disk space the package will take up and asks for confirmation of the package installation. Entering Y (or just hitting Enter, as yes is the default action) will allow the installation to occur. This can be bypassed by adding the -y flag to the command:

sudo apt-get install tree -y

Installing this package makes tree available for the user.

USING AN INSTALLED PACKAGE

Tree is a command line tool which provides a visualisation of the directory structure of the current directory, and all it contains.

- Typing tree runs the tree command. For example:

tree..

├── hello.py

├── games

│ ├── asteroids.py

│ ├── pacman.py

│ ├── README.txt

│ └── tetris.py

- Typing man tree gives the manual entry for the package tree
- Typing whereis tree shows where tree lives:

tree: /usr/bin/tree

UNINSTALLING A PACKAGE WITH APT

REMOVE

You can uninstall a package with apt-get remove:

sudo apt-get remove tree

The user is prompted to confirm the removal. Again, the -y flag will auto-confirm.

PURGE

You can also choose to completely remove the package and its associated configuration files with apt-get purge:

sudo apt-get purge tree

VI. RESULTS

When the pressure switch is pressed, the buzzer turns on. Spectacles are used by the victim, on right side of the spects the tear gas will be sprayed on the attacker eyes to harm

the attacker physically and on other side, the camera is fixed to visualize the live streaming video.

In Parallel, the location along with the messages is sent to emergency contacts. The received persons open the IP which is fixed to the emergency contacts to view the live video, so that this will be helpful to get the right justice for the victim.

it is the observed that the image of the emergency contacts that shows a message "I'm in Danger save me" along with the location which is tracked through GPS receiver. This will alert the emergency contacts through which help can be received easily to the victim. it is observed that the image of live streaming video is captured along with IP address. The IP address is already fixed to the contact list.

VII. CONCLUSIONS

The paper presents designing about the critical issues faced by women at present days and will help to solve them technologically with compact equipment and ideas. Using wrist band and spectacles, the mechanisms like tear gas release, screaming alarms, live streaming video and also alerting the emergency contacts by sending the messages with the location. This system can overcome the fear that scares every woman in the country about her safety and security

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