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Smart Aided Device for Human Safety Using IoT

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Abstract

The safety of people is a increasing Emergency in India and other countries. The primary issue in the handling of these cases by the police lies in constraints preventing them from responding quickly to calls of distress. To aid in the removal of these distress, this paper introduces the position sensor, panic button and GSM, it conveys the message containing the person is in emergency as an alert message. One of the aim of this work is for safety purpose of people.People safety has always been an issue even in these modern times with so much advancement in technology. People are not safe anywhere and are most vulnerable when traveling alone into lonely roads and deserted places. Existing hand held safety devices for people require human intervention for activating the device such as pressing the button or shake the device etc. after sensing the danger. We propose a solution which will try to overcome the disadvantages of the existing systems and also aim at providing false proof safety to people. The proposed work aims at designing a safety device that relies on providing security to people by the method of connectivity to the device and alerting nearby people and police when a people is not safe. Moreover, for first-hand safety, shockwave generator is also designed that people can use to attack the perpetrator.

Semantic social engineering attacks are a pervasive threat to computer and communication systems. By employing deception rather than by exploiting technical vulnerabilities, spear-phishing, obfuscated, drive-by downloads, scare ware, and+ other attacks are able to circumvent traditional technical security controls and target the user directly. Our aim is to explore the feasibility of predicting user susceptibility to deception-based attacks through attributes that can be measured, preferably in real-time and in an automated manner. Toward this goal, we have conducted two experiments, the first on users recruited on the Internet, allowing us to identify useful high-level features through association rule mining, and the second on a smaller group of users, allowing us to study these features in more detail. In both experiments, participants were presented with attack and non-attack exhibits and were tested in terms of their ability to distinguish between the two. Using the data collected, we have determined practical predictors of users' susceptibility against semantic attacks to produce and evaluate a logistic regression and a random forest prediction model, with the accuracy respectively. We have observed that security training makes a noticeable difference in a user's ability to detect deception attempts, with one of the most important features being the time since last self-study, while formal security education through lectures appears to be much less useful as a predictor. Other important features were computer literacy, familiarity, and frequency of access to a specific platform. Depending on an

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organization's preferences, the models learned can be configured to minimize false positive or false negatives or maximize accuracy, based on a probability threshold.

In today's world, the major question in every girl's mind is about her security and safety. A few years back, a woman has to go for the convivial system (social media) to protest and warn about sexual harassment faced their self? A report shows that 51% have to experience sexual harassment unwillingly. The percentage turned to 66%, 38% and 35% for the public places, workplace and at their home respectively. At first, the cases handling by the police are a major issue but there have some botheration's like not knowing the victim's exact emergency, not knowing surely the crime occurred at all, and then lack evidence, police stops investigation.

Nowadays, personal safety has become a significant problem for everyone, but especially for people. Here we introduce a system which makes sure the people protection. The device can be easily carried and could be taken whenever they sense the danger. The project idea is to provide a swift responding and reporting safety device for people. The application helps people to overcome with fear and can call to her guardian that he/she can take the help. It reports a situation just by pressing button on the smart band. Our project resembles a smart band; it has the capability to protect the people, with the various sensors integrated within the band. When he/she wearing the band or a watch, if he/she face any Kind of harassment or if he/she feel something happened to be endanger he/she can press the button located on the watch, when he/she fall in down, the various information such as emergency, body posture, pulse rate and SMS alert are sent to the predefined number by using the GSM. This will help to reduce the crime against the people.

Objective

To safe and secure the people we develop this project that can act as a rescue device and protect at the time of danger. To provide a reliable security system for a people when they are feel unsafe. This device consists of a system that ensures dual alerts in case a people is harassed or he/she thinks he/she is in trouble.

Introduction

In modern life, people are maintaining their job from the kitchen to the office daily but the major concern is their security. When it's a question about people's safety and security they will get no appropriate answer to it, they just have some insecurity and unwanted situation to face. They are suffering from all those incidents regularly. Even girls are not safe in their living place, in their room at all because of sexual harassment. A woman or even a little girl is not secure in this dirty society, sometimes they are forcefully being harassed by any of their relatives or other outsiders continuously without saying anything to him. The victim of sexual harassment is the most helpless person in this society because after being sexually harassed her own family denies to take her responsibility and overpass everything. Because of social reputation and prestige, the victim's family just decline what was happened with their girl. Sometimes the family members want to protest but they can't continue their movement against criminals due to lack of enough evidence. Is that easy for a sexually harassed woman or girl to be stable on her normal mental condition as like as before? So, lack of evidence the victim doesn't get justice, just because he/she can't

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explain what was exactly happened to her at that moment. That is the present situation of our society, because of increasing crimes like sexual harassment, rape, and so on, they are being scared to go out of the home. Though technology is rapidly increasing along with the development of new gadgets, people and girls are facing many problems everywhere. With the development of the world, people are adorning their positions in many high offices like parliament, bank, school, college university, and many other important places, they are also preparing themselves for every challenge in modern society but the prime thought haunting each of them getting the freedom to step on the pathway at day or night without worrying about their security. Moreover, the lack of data to find out the statistical graph is insufficient and proper steps may have hampered against this harassment. An efficient automatic operating security device using Raspberry pi, flex sensor for turning on the device by the activity of human hand, a buzzer for instant alarm, camera for capturing the scenario, and GSM module for tracking the emergency and sending SMS.

People safety has always been an issue even in these modern times with so much advancement in technology. People are not safe anywhere and are most vulnerable when traveling alone into lonely roads and deserted places Existing handheld devices that are available for people safety require people intervention to activate them such as pressing the button or shake the device etc. after sensing the danger. However, for some reason if a woman has no time to activate it when he/she is danger, then the purpose of the safety device is not solved. In a country like India where the growth rate of crime is considered to be more than the growth rate of population, which includes burglary, murders, rapes, and many more people's safety is believed to be one of the most important issues. Safety of people in India has become a major issue not. According to the National Crime Records Bureau, in 2016 the sexual harassment is increased by 82% compared with the previous years. Across all cases, 95% of rapists were not strangers but family, friends and neighbour ship the wake of recent rape and murder of young people, much of the public speak about it has been confined to outrage, punishment and tougher laws. Each and every day people and children are

Being abused or holstered around the world. It is necessary to safeguard people from those predators. Laws alone will not protect her from every situation, he/she has to defend herself. For that a self-defence device is needed. Semantic social engineering attacks target the user-computer interface in order to deceive a user into performing an action that will breach a system's information security. On any system, the user interface is always vulnerable to abuse by authorised users, with or without their knowledge. Traditional deception-based attacks, such as phishing emails, spoofed websites and drive-by downloads, have shifted to new and emerging platforms in social media , cloud applications and near field communications . Efforts towards technical defence against semantic attacks have led to the development of solutions that are typically specific in design. This can be attributed to the he/sheer complexity required to translate what is essentially human deception into code, as well as attempting to combine this into a solution that spans disparate platforms. One example is phishing emails, where filtering and classification software have proven to be highly successful. However, these defence mechanisms are built to function on email systems only, unable to prevent conceptually very similar phishing attacks in instant messaging, social media and other platforms. Similarly, automated tools

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developed to block drive-by downloads via web browsers have been shown to be highly effective in mitigating the threat yet the same tools cannot prevent a drive-by attack in removable media. Alternative approaches to technical solutions have focused on managing users themselves, rather than the computer interface. For example, creation of policy and process for user compliance has helped to define specific rules which enforce secure system use, but these are almost never applicable to the private user of a computer system and the Internet. Furthermore, compliance guidelines are usually static in nature and therefore can quickly become out-of date when new attack methods appear. User education and awareness training have been evaluated extensively and in practice have been shown to improve user responses to specific attack scenarios, but it is difficult to automate this process and even more difficult to measure its lasting effect. Moreover, training material tends to be limited to known exploitations and requires regular updates to include new attack vectors. Systems generating visual warnings or security indicators have also been implemented, presented to users in real-time by indicating a possible attack or whether a potential threat exists, but research has shown that in practice users often do not pay attention to them or do not understand them. A comprehensive survey by Shoji et al. Evaluating the state of phishing detection provides a valuable insight into potential future defences. The researchers have highlighted the application of machine learning techniques as a promising approach to defence, producing accurate attack classifiers and effective defences against zero-day threats. Measuring the effectiveness of user training has also been suggested, where research towards a hybrid user/software solution is indicated as a potential multi-layered approach to protection. Given the limitations of defences designed for specific attacks and platforms, it is attractive to look also towards the feasibility of predicting a user's susceptibility to different semantic attacks in order to augment technical systems with user-driven defence. For example, user susceptibility profiles can be used to support systems that are dynamic, by training predictors with user data collected in real-time or over a period of time, and allowing dynamic emergency of access rights dependent on a detected user profile. Furthermore, they could support the development of context-based user awareness systems, where training material would be tailored to users depending on their susceptibility to different deception vectors. User susceptibility profiles can also provide useful measurement criteria for predicting the performance of human sensors of semantic attacks, indicating whether a user report of a suspected attack is accurate (and worth investigating); sharing analogies to the learning and prediction capabilities employed in sandbox antivirus defences for categorising and identifying different malware families . Towards this vision, we have conducted two experiments with the participants being asked to tell whether particular exhibits show an attack or not. We have collected data regarding both the users and their performance in detecting attacks that employ different deception vectors and have developed two prediction models. The first experiment helped identify high level predictors that can be measured ethically, automatically and in real-time, whilst being applicable across the wider Internet population; we define this study as stage.

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Exsting System

The existing system consists of a microcontroller embedded with a few bio sensors such as motion sensor, temperature sensor, and pulse rate sensor, a BLE module and power supply. The system is connected to the mobile through the Bluetooth module.

The sensors frequently monitor the body condition of the user and when an abnormality occurs within the body, which is pre-programmed in the system compares and when abnormality is confirmed then the collected data is acquired and activate the pre-installed app which in return sends the messages to alert the police and the people who use the designed app.

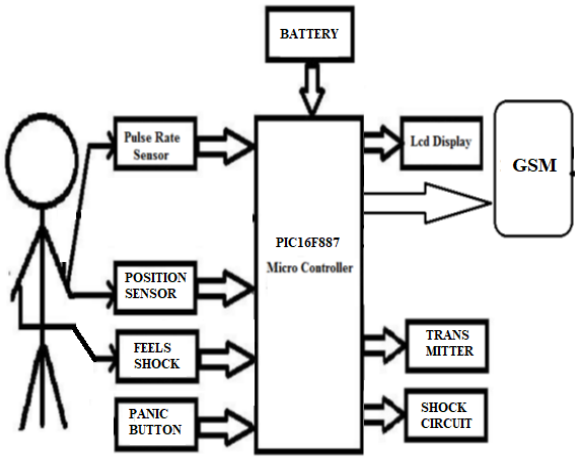
Proposed System

The GSM will also send the information to user mobile number.

In addition electric shock circuit is used in glove, it is compact, light in weight and can easily be carried and the components used in this project are easily available and very economical. It restrict attackers by gives the shock without killing them. These are all the components which is embedded into the wearable device. The total components gets a power supply from a rechargeable battery.

The proposed work aims at designing a safety device that relies on providing security to people based method of connectivity to the device and alerting nearby people and police when a people is not safe.

Block Diagram



Block Diagram Explanation

According to the block diagram, the system is a smart safety system which consists of a microcontroller with bio sensors such as LCD display, GSM module and a power supply. This sensors frequently monitor the body condition of the user and when an abnormality occurs within the body, which is preprogrammed in the device compares and when abnormality is confirmed then the collected data is acquired and activities sends the emergency and alert message to family, and police

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LI – ION BATTERY

Lithium-ion (Li-ion) batteries have become the predominant energy storage means for off-grid solar products due to their high efficiency, low cost, high capacity, lack of memory effect, and long cycle life. Li-ion is an evolving technology, first marketed in the early 1990s, and research and development work is ongoing to improve safety, increase performance, and extend lifetime. This Technical Note is a 2019 update that describes the types of Li-ion batteries currently on the market, new technologies that promise substantial performance enhancements, and briefly outlines proper control methods, safety considerations, testing, and shipping protocols. It is the first in a three-part series. Parts II and III discuss safety, testing, and shipping in more detail and can be found on the Lighting Global website.

Li-ion batteries feature many characteristics that are well-suited for use in off-grid applications. They have a long cycle life and do not suffer from the high self-discharge rate and memory effect of nickel-cadmium (NiCd) and nickel metal hydride (NiMH) batteries. Charging efficiency is excellent, up to 99% for some Lion chemistries. Unlike sealed lead acid (SLA) and NiCd, Li-ion batteries do not contain toxic heavy metals. Li-ion systems must be correctly designed to achieve good performance and avoid serious safety hazards that can result from battery cell abuse and improper operation. Overcharging, overheating, short-circuiting, or damaging a charged Li-ion battery can result in fire or explosion. Proper design and testing can avoid these hazards and ensure safety, high performance, and long lasting operation of off-grid products. Lithium-ion battery fundamentals All battery cells have positive and negative terminals, and these are connected to internal electrodes (physical chemical structures) that store and release electrochemical energy that is used to drive an external electrical load. Li-ion batteries use a process known as intercalation, in which lithium ions∗ are incorporated into the structure of the electrode materials. Inside the cell, lithium ions move from the positive to the negative electrode during charging and from the negative to the positive electrode as the battery is discharged. Electrons move through an external circuit in the same direction as the lithium ions, driven by an external charger (when charging) or by the stored potential chemical energy (available to drive a load) when the battery is discharging.

Types of Li-Ion Batteries The term “lithium-ion battery” refers to a large and diverse family of different battery chemistries, form factors, sizes, and cell constructions. At a basic level, all li-ion battery cells have three functional layers: the positive electrode (cathode), the negative electrode (anode), and the separator. The separator is typically a polymeric membrane saturated with a liquid electrolyte that enables lithium ion transport but prevents direct contact between the electrodes. These thin layers are either rolled or stacked to increase the effective surface area available for energy storage, and then packaged in an outer cell housing (Figure A1). Positive electrode (cathode) materials1 Li-ion batteries are often classified according to the composition of their positive electrodes. Table 1 lists the major types of positive electrode (cathode) materials commercially available on the market.

Lithium cobalt oxide (LCO) Lithium cobalt oxide was the first widely commercialized cathode material and is still in common use in consumer products. LCO has high energy density but is not

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well suited for use in off-grid products because of lower cycle life and poorer safety. Nonetheless, LCO batteries are ubiquitous and still frequently used for these applications. Lithium manganese oxide (LMO) Pure LMO batteries have good thermal stability and safety but lower cycle life; they have declined in commercial use and have been replaced by blending the manganese oxide with nickel and cobalt (NMC). Nickel cobalt aluminium (NCA) Like LCO, NCA batteries have lower thermal stability than competing technologies. Their cost and cycle life also make them less attractive for off-grid products. Lithium nickel manganese cobalt oxide (NMC, NCM) Different blends of nickel, manganese, and cobalt are a successful and promising approach for Li-ion batteries. The ratio of these three elements is sometimes listed in the electrode name – an equal mix would have the chemical formula LiNi1/3Mn1/3Co1/3O2 and be listed as NMC 1-1-1 or simply NMC 111. NMC blends offer combinations of good cycle life, safety, and high energy density. The ratios of elements can be tailored to emphasize qualities that target specific applications including off-grid products. Lithium Iron Phosphate (LiFePO4) LiFePO4 batteries exhibit qualities that make them ideally suited for off-grid products where cost, safety, stability, and cycle life are primary requirements.3 They have lower energy density than competing Li-ion chemistries and a lower output voltage of 3.2V, but this is acceptable for most off-grid applications. Many successful off-grid products use LiFePO4 batteries.

Negative electrode (anode) materials Carbon based anodes Graphite formulations are used for the negative electrode in the majority of Li-ion commercial cells. They can be natural graphite, artificial graphite, or amorphous carbon.4 Lithium ions become intercalated in the carbon sheet structures when the cell is charged and released during discharge. When the cell is first charged, a solid electrolyte interphase (SEI) layer forms on the graphite surface. The SEI layer stabilizes the anode by preventing reactions between the graphite and the electrolyte. SEI layer integrity plays an important role in cell performance. Lithium titan ate (LTO) Lithium titan ate (LTO) anode materials can be used with LMO or NMC cathodes to make a Li-ion cell. LTO cells offers very high cycle life, excellent thermal stability, excellent safety, and good low temperature operation. However, they have much lower energy density than other Li-ion technologies and a low cell voltage of 2.4V. Cell construction Li-ion cells are available in rigid cylindrical and prismatic (rectangular) constructions. Cylindrical cells are a well-established technology and are used for many other battery types, and prismatic cells have a long history of being used in mobile phones and other consumer electronic devices. These cells typically have built-in safety mechanisms that are designed to shut off current flow out of the battery (if the temperature of the cell escalates to a dangerous level) as well as release internal pressure from gas build-up in the case of an internal short circuit or other cell abuse event. “Pouch” cells are a newer technology, similar in shape to prismatic cells, that use a thin, flexible laminate instead of a rigid housing. They offer cost, size, and weight savings, but may not offer the same safety and durability qualities of prismatic cells.

Next generation Li-ion battery technologies Advanced separator and electrolyte systems The solid-state and polymer electrolyte technologies mentioned above represent a major next-generation approach for Li-ion batteries. These systems use either a gelled electrolyte (a lithium salt suspended in a polymer gel) or a solid polymer electrolyte (e.g. an inorganic lithium salt dissolved in a polyethylene oxide (PEO) framework). Polymer electrolytes contain no or reduced

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organic solvents and therefore mitigate or completely eliminate the hazard posed from this flammable component and substantially increase the safety of the cell. High cost and low ionic conductivity of polymer electrolytes remain substantial barriers to commercialization. Separators with improved thermal properties are currently available for use with liquid electrolytes. Shutdown separators, for example, feature both PE and PP layers and are designed so that the pores in the film melt closed, and shut down current flow, when the cell overheats. Ceramics can also be incorporated into the separator to increase temperature resistance.6 New cathode materials Several new cathode materials are under development. “5-volt” materials like LiNi0.5Mn1.5O4 support higher voltages and thus higher energy densities than existing materials, which usually have a maximum charging voltage of 4.2 V (see Table A2). Alternative phosphate materials such as LiMnPO4 may offer the advantages of LiFePO4 while supporting voltages and thus energy densities comparable to or higher than those of other Lion chemistries.7 Some of these new materials will require new electrolytes and other cell components able to withstand the higher voltages, and thus far technical barriers remain. Higher battery voltages would be very attractive to many Li-ion applications.Cathode blends Blend of various cathode materials are being researched to improve performance and reduce cost. Lithium NMC 111 is being joined by other cathode mixtures to increase certain performance aspects and lower cost by reducing the amount of cobalt. NMC 811, NMC 532, and NMC 442, among others, are being developed and tested for commercial use (particularly automotive applications).8 Cathode blends can also include LiFePO4 and NMC.9 In order to be commercially successful, research results will need to produce a cell with a combination of the best qualities of the component materials at an acceptable cost. New anode materials Anodes based on silicon provide higher energy density than graphite but can be difficult to manufacture. 1 Research to bring “3-D” nanostructured silicon anode materials to the market is ongoing; nanotechnology could also result in improvements to cathode materials.10 The molecular structure of silicon enables a large increase in Li+ ion storage and could greatly increase the capacity, energy density, and specific energy capability of the anode (up to a factor of 10 by some estimates). The challenge lies in developing a material with low volume change during charge/discharge.

Charging and Discharging Li-ion Batteries

Proper charge control and protection circuitry is critical for Li-ion batteries. Overcharging a Li-ion battery can lead to a fire or explosion, and over discharging can permanently damage the battery. Li-ion batteries are usually charged in two steps (Figure 2). The first step is a constant-current charge at 0.5-1C until the battery reaches its maximum voltage, usually 4.1-4.2 V/cell. After the ending voltage is reached, the battery is charged at constant voltage until the current drops below a threshold, between 0.02C and 0.1C12,13 , or for a fixed amount of time, around 2 hours. If the battery is severely depleted, a slow charge (0.1C) is necessary to bring the voltage up to 2.5-3 V/cell before the 0.5-1C charge can begin; however, attempting to charge a severely depleted battery may be unsafe, and the battery may have permanent capacity loss.14,15 Li-ion batteries are not harmed by a partial charge; in fact, charging to a lower voltage will extend the cycle life of the battery, but with a significant capacity penalty. Charging a 4.2-volt battery to 4.1 V results in a 10% or larger reduction in capacity.1

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Accurate voltage regulation is critical for safely charging Li-ion batteries; the tolerance for overcharging can be 50 mV or less.15 Charging cells in series requires circuitry to balance the Most Li-ion batteries should not be charged at ambient temperatures below 0°C or above 45-50°C.16 Charging at high temperature will decrease cycle life and may present a safety hazard; phosphate-based batteries may have somewhat better high-temperature performance than other Li-ion chemistries. Charging at low temperatures may lead to the growth of lithium metal dendrites,17 which can result in an internal short circuit, destroying the battery and potentially causing a fire. Ensuring that the temperature remains within the acceptable range is especially important for products that may be charged outdoors in direct sunlight. Unlike NiCd and NiMH cells, lithium ion batteries do not have a memory effect and do not benefit from full discharge cycles. Fully discharging a Li-ion battery will reduce its life, and discharging the battery below 2.5-3 V/cell can cause permanent damage 18 or shortcircuiting.19 Voltage and temperature limits vary from battery to battery. The voltage and temperature ranges in this technical note are general guidelines; the battery manufacturer's datasheets should be consulted for the limits that apply to specific battery models. Shelf life and battery storage Li-ion batteries have a very low self-discharge rate. 20 Most "self-discharge" is actually standby current from connected electronics built into the battery cell, battery pack, or the finished product. Standby current varies according to the design of those electronics. Manufacturers should measure the current consumption of connected electronics and store their batteries in a partially discharged state, with enough current reserve to keep the battery from over discharging. In most cases, this means batteries should be stored at or near room temperature (25°C) at 20-40% state of charge. Storage while fully charged or in elevated temperatures should be avoided as this will put stress on the cell, reduce battery life, and increase the amount of energy available for thermal runaway should an accident occur. Disposal The metals in lithium-ion batteries, including cobalt, nickel, manganese, iron, and aluminium, are not as toxic as the lead or cadmium in SLA or NiCd batteries; many governments allow their disposal in landfills. While Liion batteries can be recycled to recover metals, recycling is expensive, and the recycling infrastructure is not as widespread as that for lead-acid batteries. Charged lithium-ion batteries pose a fire or explosion hazard if crushed, punctured, or incinerated; batteries should be fully discharged before disposal. Li-ion safety overview22 While all batteries can present safety hazards if used improperly, Li-ion batteries are especially sensitive to proper handling and treatment. Li-ion batteries can vent electrolyte, catch fire, or explode if overcharged, overheated, or short-circuited. Unlike the water-based electrolytes in SLA, NiCd, and NiMH batteries, Li-ion electrolytes use flammable organic solvents. Li-ion battery fires can be extinguished with water or standard dry chemical fire extinguishers.23 Detailed safety and hazards information can be found in Part II of this Li-ion battery series. Briefly, Li-ion battery management should always adhere to the following: • Li-ion cells should always be charged according to the battery manufacturer's specifications. Under no circumstances should cells be subject to overcharge, over discharge, or short circuit.

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Software requirement:

embedded c :

Embedded C is one of the most popular and most commonly used Programming Languages in the development of Embedded Systems. So, in this article, we will see some of the Basics of Embedded C Program and the Programming Structure of Embedded Embedded C is perhaps the most popular languages among Embedded Programmers for programming Embedded Systems. There are many popular programming languages like Assembly, BASIC, C++ etc. that are often used for developing Embedded Systems but Embedded C remains popular due to its efficiency, less development time and portability. Before digging in to the basics of Embedded C Program, we will first take a look at what an Embedded System is and the importance of Programming Language in Embedded Systems.

EMBEDDED SYSTEM:

An Embedded System can be best described as a system which has both the hardware and software and is designed to do a specific task. A good example for an Embedded System, which many households have, is a Washing Machine. We use washing machines almost daily but wouldn't get the idea that it is an embedded system consisting of a Processor (and other hardware as well) and software.Embedded Systems can not only be stand-alone devices like Washing Machines but also be a part of a much larger system. An example for this is a Car. A modern day Car has several individual embedded systems that perform their specific tasks with the aim of making a smooth and safe. Some of the embedded systems in a Car are Anti-lock Braking System (ABS), Temperature Monitoring System, Automatic Climate Control, Tyre Pressure Monitoring System, Engine Oil Level Monitor, etc.

PROGRAMMING IN EMBEDDED SYSTEM:

As mentioned earlier, Embedded Systems consists of both Hardware and Software. If we consider a simple Embedded System, the main Hardware Module is the Processor. The Processor is the heart of the Embedded System and it can be anything like a Microprocessor, Microcontroller, DSP, CPLD (Complex Programmable Logic Device) and FPGA (Field Programmable Gated Array).

All these devices have one thing in common: they are programmable i.e. we can write a program (which is the software part of the Embedded System) to define how the device actually works. Embedded Software or Program allow Hardware to monitor external events (Inputs) and control external devices (Outputs) accordingly. During this process, the program for an Embedded System may have to directly manipulate the internal architecture of the Embedded Hardware (usually the processor) such as Timers, Serial Communications Interface, Interrupt Handling, and I/O Ports etc.From the above statement, it is clear that the Software part of an Embedded System is equally important to the Hardware part. There is no point in having advanced Hardware Components with poorly written programs (Software).There are many programming languages that are used for Embedded Systems like Assembly (low-level Programming Language), C, C++, JAVA (high-level programming languages), Visual Basic, JAVA Script (Application level

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Programming Languages), etc.In the process of making a better embedded system, the programming of the system plays a vital role and hence, the selection of the Programming Language is very important.

Introduction To Embedded C Programming Language

Before going in to the details of Embedded C Programming Language and basics of Embedded C Program, we will first talk about the C Programming Language.The C Programming Language, developed by Dennis Ritchie in the late 60's and early 70's, is the most popular and widely used programming language. The C Programming Language provided low level memory access using an uncomplicated compiler (a software that converts programs to machine code) and achieved efficient mapping to machine instructions.The C Programming Language became so popular that it is used in a wide range of applications ranging from Embedded Systems to Super Computers.

Embedded C Programming Language, which is widely used in the development of Embedded Systems, is an extension of C Program Language. The Embedded C Programming Language uses the same syntax and semantics of the C Programming Language like main function, declaration of datatypes, defining variables, loops, functions, statements, etc.The extension in Embedded C from standard C Programming Language include I/O Hardware Addressing, fixed point arithmetic operations, accessing address spaces, etc.

Embedded System And Its Real Time Applications

The World is filled with Embedded Systems. The development of Microcontroller has paved path for several Embedded System application and they play a significant role (and will continue to play in the future as well) in our modern day life in one way or the other.Starting from consumer electronics like Digital Cameras, DVD Players to high end and advanced systems like Flight Controllers and Missile Guidance Systems, embedded systems are omnipresent and became an important part of our life.The way we live our life has been significantly improved with the utilization of Embedded Systems and they will continue to be an integral part of our lives even tomorrow.Another important concept we are hearing these days is Real – Time Systems. In a real time system, Real Time Computing takes place, where a computer (an Embedded System) must generate response to events within certain time limits.

Before going in to the details of Real Time Applications of Embedded Systems, we will first see what an Embedded System is, what is a real time system and what is real time operating system.

Lcd Display

Nowadays, we always use the devices which are made up of LCDs such as CD players, DVD players, digital watches, computers, etc. These are commonly used in the screen industries to replace the utilization of CRTs. Cathode Ray Tubes use huge power when compared with LCDs, and CRTs heavier as well as bigger. These devices are thinner as well power consumption is

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extremely less. The LCD 16×2 working principle is, it blocks the light rather than dissipate. This article discusses an overview of LCD 16X2, pin configuration and its working

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The term LCD stands for liquid crystal display. It is one kind of electronic display module used in an extensive range of applications like various circuits & devices like mobile phones, calculators, computers, TV sets, etc. These displays are mainly preferred for multi-segment light-emitting diodes and seven segments. The main benefits of using this module are inexpensive; simply programmable, animations, and there are no limitations for displaying custom characters, special and even animations, etc.

Lcd 16×2 Pin Diagram

The 16×2 LCD pinout is shown below.

- Pin1 (Ground/Source Pin): This is a GND pin of display, used to connect the GND terminal of the microcontroller unit or power source.
- Pin2 (VCC/Source Pin): This is the voltage supply pin of the display, used to connect the supply pin of the power source.
- Pin3 (V0/VEE/Control Pin): This pin regulates the difference of the display, used to connect a changeable POT that can supply 0 to 5V.
- Pin4 (Register Select/Control Pin): This pin toggles among command or data register, used to connect a microcontroller unit pin and obtains either 0 or 1(0 = data mode, and 1 = command mode).
- Pin5 (Read/Write/Control Pin): This pin toggles the display among the read or writes operation, and it is connected to a microcontroller unit pin to get either 0 or 1 (0 = Write Operation, and 1 = Read Operation).
- Pin 6 (Enable/Control Pin): This pin should be held high to execute Read/Write process, and it is connected to the microcontroller unit & constantly held high.
- Pins 7-14 (Data Pins): These pins are used to send data to the display. These pins are connected in two-wire modes like 4-wire mode and 8-wire mode. In 4-wire mode, only four pins are connected to the microcontroller unit like 0 to 3, whereas in 8-wire mode, 8-pins are connected to microcontroller unit like 0 to 7.

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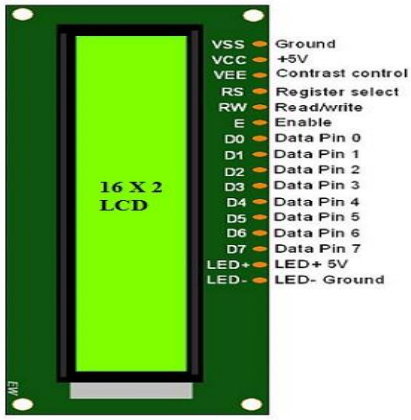
- Pin15 (+ve pin of the LED): This pin is connected to +5V
- Pin 16 (-ve pin of the LED): This pin is connected to GND.



A 16×2 LCD has two registers like data register and command register. The RS (register select) is mainly used to change from one register to another. When the register set is '0', then it is known as command register. Similarly, when the register set is '1', then it is known as data register.

Conclusion

The proposed people safety device aims at proving complete security to people in current scenarios. The fingerprint is used as unique identifier for the user so that no one can generate a false alarm and also to ensure that alert is raised only in stress situations. To provide comprehensive security, buzzer is included in the design, so that any nearby person gets alerted about the mis-happening. Sending text messages ensure that close relatives and police gets alerted with the current emergency of victim. In case people feels need of self-defence he/she can make use of shockwave generator to temporarily incapacitate the perpetrator. Besides, the hardware based design, an android application is developed to provide additional safety features like sending group messages, audio recording and identifying nearby safe emergency in map. The paper presents the prototype of a smart device for people safety, performance metrics have to be considered for further analysis to prove its efficiency

As security is a major concern for every woman in this modern world, this device can be replaced as a smart and effective one. For the first time, this type of device has been implemented for direct evidence collecting and saving them on web storage for future use. It has been designed for mainly people's security purposes but also could be used for aged citizens and children's safety purposes. In the future, this device will be more user-friendly by scaling this device's size. Besides, more advanced technology will be used for implementation to make this security device low in cost.

A safety device for people, which can be carried using Gsm and two sensors has created. This may help people when there is any emergency. The gsm sends message automatically to the

nearby police station and relatives by tracking their emergency. This may help people to move freely wherever he/she wants.

Reference

[1] Basavaraj Chougula, Archana Naik, Monika Monu, Priya Patil and Priyanka Das-“ Smart girls security system International Journal of Application or Innovation in Engineering & Management (IJAIEM) “ISSN:2319-4847 Volume 3, Issue 4, April 2014.

[2] Borges,L.M. Inst. de Telecomun.-DEM, Univ. da Beira Interior, Covilh Portugal Barroca, N. ; Velez, F.J. ; Lebres, A.S-“Smart-clothing wireless flex sensor belt network for foetal health monitoring; Pervasive Computing Technologies for Healthcare, 2009. Pervasive Health 2009. IEEE, London.

[3] Rahdar, R. ; Bell Helicopter, Fort Worth, TX, USA ; Stracener, J.T. ; Olinick, E.V-“A Systems Engineering Approach to Improving the Accuracy of Mobile Station Emergency Estimation Systems Journal”, IEEE (Volume:8 , Issue: 1 ,2013).

[4] Guang Zhang, “Medical alert systems with Tele Health& telemedicine monitoring using GSM and technology”, IEEE Conference, Coimbatore, 2012.

[5] Veeraiah, V., Pankajam, A., Vashishtha, E., Dhabliya, D., Karthikeyan, P., & Chandan, R. R. (2022). Efficient COVID-19 Identification Using Deep Learning for IoT. 2022 5th International Conference on Contemporary Computing and Informatics (IC3I), 128–133. IEEE.

[6] JiewenZheng; Inst. of Med. Equip., Acad. of Mil. Med. Sci., Tianjin, China ; Guang Zhang ; Taihu Wu, Design of Automatic Accelerometer for Elderly Based on Triaxial Accelerometer ; Bioinformatics and Biomedical Engineering , 2009. ICBBE 2009. 3rd International Conference, IEEE Beijing.

[7] Mirjami Jutila, Helen Rivas, Pekka Karhula, Susanna Pantsar "Implementation of a Wearable Sensor Vest for the Safety and Wellbeing of Children", The second international Workshop on Body Area Sensor Networks(BASNet-2014), Elsevier B.V, 2014.

[8] Parth Sethi, Lakhe/shey Juneja, Punit Gupta and Kaushlendra Kumar Pandey "Safe Sole Distress Alarm System for Female Security Using IOT", Springer Nature Singapore Ptc Ltd. 2018.

[9] Kshirsagar, P. R., Reddy, D. H., Dhingra, M., Dhabliya, D., & Gupta, A. (2022a). A Review on Comparative study of 4G, 5G and 6G Networks. 2022 5th International Conference on Contemporary Computing and Informatics (IC3I), 1830–1833. IEEE.

[10] G. Eason, R.S. Yarrabothu and B. Thota, "Abhaya: An Android App for the safety of people," 2015 Annual IEEE India Conference (INDICON), New Delhi, 2015.

[11] S. Sharmin, M. Khaliluzzaman, S. F. Khatun and S. Khanam, "An androidbasedsecurityalertsystemforfemale,"2016International Workshop onComputationalIntelligence(IWCI),Dhaka,2016.

[12] H. Wax, "Blending technology and the law for cyber security [People to Watch],"in IEEE People in Engineering Magazine, vol. 2, no. 2, pp. 10-11,Winter 2008.

[13] Kshirsagar, P. R., Reddy, D. H., Dhingra, M., Dhabliya, D., & Gupta, A. (2022b). Detection of Liver Disease Using Machine Learning Approach. 2022 5th International Conference on Contemporary Computing and Informatics (IC3I), 1824–1829. IEEE.

[14] Borges,L.M. Inst. de Telecomun.-DEM, Univ. da Beira Interior, Covilha, Portugal Barroca, N. ; Velez, F.J. ; Lebres, A.S., Smartclothing wireless flex sensor belt network for foetal health monitoring; Pervasive Computing Technologies for Healthcare, 2009. PervasiveHealth 2009. , IEEE, London.

[15] G. Toney, F. Jabeen and Puneeth S, "Design and implementation of safety armband for people and children using ARM7," 2015 International Conference on Power and Advanced Control Engineering (ICPACE),Bangalore,2015.

[16] R. Velayutham, M. Sabari and M. S. Rajeswari, "An innovative approach for people and children's security based emergency tracking system," 2016 International Conference on Circuit, Power and Computing Technologies (ICCPCT), Nagercoil.

[17] G. C. Harikiran, K. Menasinkai and S. Shirol, "Smart security solution for people based on Internet O f Things (IOT),"2016 International Conference on Electrical, Electronics, and Optimization Techniques(ICEEOT).

[18] K. Seelam and K. Prasanti, "A novel approach to provide protection for people by using smart security device,"2018 2nd International Conference on Inventive Systems and Control (ICISC), Coimbatore, 2018.

[19] Dhingra, M., Dhabliya, D., Dubey, M. K., Gupta, A., & Reddy, D. H. (2022). A Review on Comparison of Machine Learning Algorithms for Text Classification. 2022 5th International Conference on Contemporary Computing and Informatics (IC3I), 1818–1823. IEEE.

[20] K. A. A. Rabaiei and S. Harous, "Internet of things: Applications and challenges,"2016 12th International Conference on Innovations in Information Technology (IIT),Al-Ain,2016.