Taking advantage of Tracking systems to design Tracking devices to face children Kidnapping Phenomenon (GSM –GPRS -GPS)

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Abstract: The research is concerned with finding out a suitable means to protect the children against this phenomenon of Children abduction using tracking systems like GSM, GPRS, GPS. Egypt witnesses a new strange phenomenon within the Egyptian community At the last time, this phenomenon is coming out from abroad to add one of the most disturbing and worrying results over the parents beside the results of the security disorder. This phenomenon is the phenomenon of children kidnapping for gaining money and it becomes one of the crimes that are committed by new gangs formed from time to time. Thus, the peoples become insecure in terms of themselves, their children, their money and their possessions. So, the research is concerned with the crime of kidnapping children as a problem arouses and worries the parents as result of not performing the necessary precautions and not using the means to follow up their children outside the home. The research aims to design of the tracking devices that are used the tracking system for following up the children in order to face this phenomenon to fir huge number of children with different contexts, traditions and financial possibilities. The new method helps in following up the kidnapped child for long time as the used system is connected with the parents via sending messages to their mobile phones when the child changes the defined location as it defines the location more accurately. the researcher designed an attractive shoes connected to a belt containing the GPS tracking system that can be installed in all kinds of shoes that can be used by the child when he want to change or replace this shoes with another one. The researcher conducts a questionnaire of the idea of securing the children by using the GPS tracking systems accompanied the children especially the proposed design, he notes that: 1.The research concern with the idea especially as many of them have no experience concerning the systems connected to the child requirements (shoes, wristwatch, school bags…etc). 2. The parents show their feeling of security by approximately 80% when using the following up systems connected to the tools of the children and their supplies.

1- Introduction:

The Egyptian Community suffers from security disorders after 25th Revolution. Consequently, this security disorders leads to the spreading of the phenomenon of Children abduction in order to force their parents to pay the ransom as those who commit such crime know very well that their parents are able to do whatever they want in order to their Children in safety. Therefore, many gangs are formed in order to kidnap and rob the children who are the most precious thing for their parents.

Thus, in Egypt it turns to be "the terrible nightmare" for both fathers and mothers especially after the increasing number of the incidents of Children abduction within the Egyptian community and editing many minutes since the beginning of the revolution till now against the absence of many children from their homes, thus the parents become more worried and terrifying. This phenomenon turns to be a means to earn the living for the members of the gangs that are specialized in such crimes under the shadow of this secure chaos and the inability of the Police to arrest the criminals or following them especially after the escalation of Violence and barbarism practices.

Therefore, the research is concerned with finding out a suitable means to protect the children against this phenomenon as well as searching for the best systems that can be used to follow up the children during their residence outside homes and developing the systems that are used in the other communities that are previously used and prove their effectiveness in the field of following up the children and decreasing the incidents of children kidnapping. As well as the research is concerned with securing the children to decrease the psychological crises from which some children suffer as result of spreading the process of other kidnapping by the means of media that took place lastly as well as the suffering of the parents of psychological pressures as a result of their hopelessness in their children's return due to not performing the necessary precautions before the crises.

The research problem

Egypt witnesses a new strange phenomenon within the Egyptian community At the last time, this phenomenon is coming out from abroad to add one of the most disturbing and worrying results over the parents beside the results of the security disorder.

This phenomenon is the phenomenon of children kidnapping for gaining money and it becomes one of the crimes that are committed by new gangs formed from time to time. Thus, the peoples become insecure in terms of themselves, their children, their money and their possessions. So, the research is concerned with the crime of kidnapping children as a problem arouses and worries the parents as result of not performing the necessary precautions and not using the means to follow up their children outside the home.

The Objective of the Research:

The research aims to take advantage of Tracking systems and design new ways of Tracking devices which used (GSM-GPRS-GPS) that ways maybe fit with the Egyptian children of following up the children in order to face children kidnapping phenomenon These ways shall be unclear to the kidnapper in order to be difficult for him to realize such devices till knowing the location of the kidnapped child.

The Significance of the Research:

1- The new method helps in following up the kidnapped child for long time as the used system is connected with the parents via sending messages to their mobile phones when the child changes the defined location as it defines the location more accurately.

2- The new method aims at the families feel comfort and hope to find their children.

3- The following-up systems helps in following up the kidnappers and facilitate the process of arresting them.

2-Previous studies of tracking devices for kids

GSM System :GSM (Global System for Mobile Communications, originally Groupe Special Mobile), is a standard set developed by the European Telecommunications Standards Institute (ETSI) to describe protocols for second generation (2G) digital cellular networks used by mobile phones..

The GSM standard was developed as a replacement for first generation (1G) analog cellular networks, and originally described a digital, circuit-switched network optimized for full duplex voice telephone. This was expanded over time to include data communications, first by circuit-switched transport, then packet data transport via GPRS (General Packet Radio Services) and EDGE (Enhanced Data rates for GSM Evolution or EGPRS).

Further improvements were made when the 3GPP developed third generation (3G) UMTS standards followed by fourth generation (4G) LTE Advanced standards.

GPRS System General packet radio service (GPRS) is a packet oriented mobile data service on the 2G and 3G cellular communication system's global system for mobile communications (GSM). GPRS was originally standardized by European Telecommunications Standards Institute (ETSI) in response to the earlier CDPD and i-mode packet-switched cellular technologies. It is now maintained by the 3rd Generation Partnership Project (3GPP). GPRS usage is typically charged based on volume of data transferred, contrasting with circuit switched data, which is usually billed per minute of connection time. Usage above the bundle cap is either charged per megabyte or disallowed. GPRS is a best-effort service, implying variable throughput and latency that depend on the number of other users sharing the service concurrently, as opposed to circuit switching, where a certain quality of service (QoS) is guaranteed during the connection. In 2G systems, GPRS provides data rates of 56–114 kbit/second. 2G cellular technology combined with GPRS is sometimes described as 2.5G, that is, a technology between the second (2G) and third (3G) generations of mobile telephone. It provides moderate-speed data transfer, by using unused time division multiple access (TDMA) channels in, for example, the GSM system. GPRS is integrated into GSM Release 97 and newer releases.

GPS System: The Global Positioning System (GPS) is a space-based satellite navigation system that provides location and time information in all weather conditions, anywhere on or near the Earth where there is an unobstructed line of sight to four or more GPS satellites. The system provides critical capabilities to military, civil and commercial users around the world. It is maintained by the United States government and is freely accessible to anyone

The use of GPS system was started by the US Defense Department to keep track of their soldiers but later on this device was available for commercial use in the world. This device was greatly used by the transportation and logistics companies who used this technology to track the real and exact position of their vehicle, ships and cargoes. Today the GPS tracking system is used for tracking individuals to know their position or to help them in case of any emergency. GPS equipped individual can seek quick and immediate help whenever required by just pressing alarm button. Besides these the GPS tracking device can easily perform the following tasks:

   a. Easily locate a missing child

   b. Track the real and exact position of the child

   c. Validate and confirm the child's position

   d. Allows parents to keep track 24/7 on their children

GPS Specifications and Working of Tracking Systems

GPS tracking device for children is based on Global Positioning System technology that functions with the help of satellite systems deployed on the orbits of the earth. Continuous signals are sent by the satellites that are received by the receptor on the earth. Thus, current position of any object or individual can be traced by determining the latitude and longitude. If the GPS device is aware of its position it can help user to determine distances and direction of other locations.

GPS Child Locator – Latest Gift of Technology

GPS tracking device for children is an extremely versatile device that has the potential to keep the parents informed about their child where about. This GPS child locator is time and again incorporated with latest technology to make it more and more advanced for the better performances and uses. It is all due to the effort of latest technology that the device has get key ring sized that can be instantly and inexpensively used to keep tabs on kids anytime and anywhere. GPS child locator system has a transmitter that can be attached to wrist or kid's schoolbag or to cell phone or computer. The transmitter with the help of existing GPS network calculates its position and then transmits to the cell phone or computer. The individual's position is usually given as a map coordinate and if the person is using any smart phone or a computer then the location is presented in a real time on a high resolution map, just like Google maps.

GPS tracking device for children has come as a boon for parents who are extremely concern and stressed about their children when they are outside their protection. With GPS child tracker around parents can have 24/7 track on their kids thereby assuring them complete safety and protection.

GPS tracking child's shoes

Figure 1. showing Some GPS tracking devices are small enough to fit in achild's shoes.

Equipping shoes with GPS tracking devices is one way to help parents put their minds at ease. parents' who losing their children, whether in a busy or through abduction. Many look for ways to ensure they can find their children if they get separated. Some other parents want a way to know when their teens arrive safely at their destinations and to ensure that they stay where they say they are going. Smart GPS shoes, which have built-in GPS devices with cell phone and motion-detector capabilities as showing in figure No 1. Parents can program the shoe devices to text them if their child travels more than a specified distance from a central location. The devices transmit their locations in real time, so parents can log on to the tracking site from anywhere and use Google Maps to see where the device is. These devices are designed to be tracked nearly anywhere in the world.

Shoes offer advanced personal location services

incorporate a small and robust GPS tracking device which hooks up with GTXC's internet user portal to offer a very compelling array of personal location services. The portal enables caretakers to easily define safe zones or un-safe zones or geographical boundaries on a Google Earth map and to set up cell phone alerts if a perimeter is breached by the wearer. This should significantly benefit caretakers of children and the elderly, as they can easily customize their monitoring and text location alerting through a simple "set it and forget it" system. The shoes also employ assisted GPS for enhanced indoor location accuracy, and will transmit for days before a recharge is needed. The intelligent power source enables a guardian to track the whereabouts of a loved one and the performance and status of the device itself from any handheld as shown in figure 2.

Figure 2.showing the tracking shoe

The device contains a GPS receiver, cellular phone, motion detector, battery charger, weighs in at just over an ounce and is slightly larger than a match box as well as being waterproof, shockproof and interchangeable as is the external, rechargeable battery..

It uses the Global Positioning System (GPS) location reporting platform to determine its location, then it forwards that information with a time stamp over the GSM cellular system to a central data receiving location. The information is processed and made available over the internet. It can be accessed with any internet connected PC, laptop or PDA and

location information is displayed as a location on a Google map.

The Toddler Tag Child

It is a great Locator for child in a crowd. This unobtrusive device attaches easily to a child's shoe, clothing or book bag with its built-in clip or included Velcro strap. The parent transmitter doubles as a keychain, so it's easy to carry anywhere as shown in figure 3.

The moment of child wanders 30 feet away from transmitter, parents'll receive an instant alert which will make it easier for parents to find her. Additionally, they can push the button on their transmitter to sound a loud alarm on their child's receiver unit.

Figure 3.showing the toddler tag

To use the Toddler Tag Child Locator, we must follow the instructions below:

a- Simply attach the Toddler Tag Child Locator receiver to your child's shoe, bag, or belt.

b- Attach the wireless transmitter to your key ring or simply place it in your pocket.

c- Switch on the receiver.

d -You will see a red light illuminate on the device.

e- At this point, the transmitter and receiver establish their own unique radio frequency connection.

f-Push the button on your wireless transmitter once to activate the receiver.

g-You will hear a few faint beeps to indicate that the unit is armed and ready for use

Great for Monitoring Your Child in:

- Malls
- Retail Locations
- Parks
- Public Pools
- Airports

Sporting Events/Stadiums

- Locator Tag Volume: 56dB
- Locator Battery (1) 12V/A23
- Expected Battery Life: 6-12 Months
- Handheld Transmitter Battery: 2 CR 2032

- Range: 150'
- Water Resistant: Yes (Not Waterproof)
- 1 Toddler Tag Child Locator Receiver
- 1 Toddler Tag Child Locator Transmitter Keychain

Tracking devices design for kids
The proposed design:

As result of the previous studies about the systems that are working by GPS tracking system, the researcher finds that a new forms can be added in the design of those systems to fit the children in terms of the behavior and wishes as well as to fit the behavior of the kidnapper and his wish to steal the child's possession. Upon this, the researcher is able to design an attractive shoes connected to a belt containing the GPS tracking system that can be installed in all kinds of shoes that can be used by the child when he want to change or replace this shoes with another one as well as to decrease the layouts as well as it can be charged electrically away from the shoes and it can be maintained and its spare parts can be replaced.
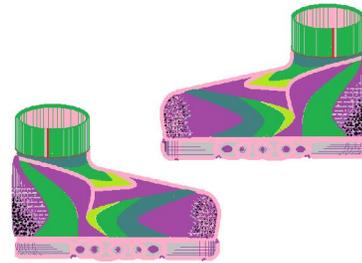
The design is shown in figure (4)

Figure 4 shows illustration of the proposed design

After The illustration, the researcher used GPS tracking system provided with cell phone can send text message to the parents mobile if the device is out of range and they can hear their kids voice, As shown in figure (5).

Figure 5. Shows the tracking system with cell phone

The researcher used this system and made the shoe prototype model and performed the design by the materials and the appropriate dimensions as well as the design is provided with the system in special belt, as it is shown in the figure(6) and figure7 showing the system inside the belt.

Figure 6. Shows the the prototype of the proposed designed shoe

As a researcher suggests that toddler tag to be added as a reserve to child clothes to follow if a malfunction occurs in the main device or kidnapper discovered it.

Figure 7 showing the tracking system inside the belt.

3. Results:

1-The researcher was able to design a device can be coupled to possibility of any shoe replaced any shoe in the possession of child.

2- As a researcher suggests that the toddler tag to be added as a reserve to child clothes to follow if a malfunction occurs in the main device or kidnapper discovered it.

3- The researcher conducts a poll of the idea of securing the children by using the GPS tracking systems accompanied to the children especially the proposed design, he notes that The parents show their feeling of security by approximately 80% when using the following-up systems connected to the tools of the children and their supplies.

Recommendation:

After performing the design and its success in achieving the objective, the researcher decides to recommend using this type of tracking device coupled to shoe.

References
1. Asoke K. Talukdar.(2011). *Mobile Computing*. 2E. Tata McGraw-Hill Education, 2011, Guilin, China, May 29--June 1, 2011, Prodceedings, Springer.
2. Cristina Chaplain.(2011). *Global Positioning System (GPS): Challenges in Sustaining and Upgrading Capabilities Persist*, DIANE Publishing.
3. Cristina T. Chaplain.(2010). *Global Positioning System: Significant Challenges in Sustaining and Upgrading Widely Used Capabilities: Congressional Testimony*, DIANE Publishing.
4. Committee on Space Launch Range Safety, Aeronautics and Space Engineering Board. (2000). *Streamlining Space Launch Range Safety*, National Academies Press.
5. Derong Liu, Huaguang Zhang, Marios Polycarpou, Cesare Alippi, Haibo He.(2011). *Advances in Neural Networks* -- ISNN 2011: 8th International Symposium on Neural Networks, ISNN.
6. DIANE Publishing,(2000). *United States Standard Flight Inspection* Manual (Reprinted July 3, 2000 to Include Changes 1, 2, and 3): May 1996, DIANE Publishing.
7. Geoff Sanders, Lionel Thorens, Manfred Reisky, Oliver Rulik, Stefan Deylitz.(2004) *GPRS Networks*, John Wiley & Sons.
8. Joanna Ledgerwood, Julie Earne, Candace Nelson. (2004). The New Microfinance Handbook: *Financial Market System Perspective, World Bank Publications*.

9. Joseph W. *(2009). Come Status Report on NAFTA Cross-Border Trucking Demonstration Pro*ject, DIANE Publishing.

10. Kai Rannenberg, Denis Royer, André Deuker. (2009). *The Future of Identity in the Information Society: Challenges and Opportunities*, Springer.

11. Kurt Geihs, Wolfgang Dr König, F. Graf Von Westarp. (2002). *Networks: Standardization, Infrastructure, and Applications* ; with 6 Tables, Springer.

12. Maciej Stasiak, Mariusz Glabowski, Arkadiusz Wisniewski, Piotr Zwierzykowski. (2010). *Modelling and Dimensioning of Mobile Wireless Networks: From GSM to LTE*, John Wiley & Sons.

13. Man Young Rhee. (2009).*Mobile Communication Systems and Security*, John Wiley & Sons.

14. Martin Sauter. (2010).*From GSM to LTE: An Introduction to Mobile Networks and Mobile Broadband*. John Wiley & Sons.

15. Nicholas Pinter.(2006). *The Adria Microplate: GPS Geodesy, Tectonics and Hazards: GPS Geodesy, Tectonics and Hazards*-1238, Springer.

16. Rajaraman. *Essentials Of E-Commerce Technology*, PHI Learning Pvt. Ltd.

17. Sjaak Laan.(2013). *It Infrastructure Architecture - Infrastructure Building Blocks and Concepts.* Second Edition, Sjaak Laan.

18. Sunil Jogi, Manoj Choudhary. (2009). *Ultra Wideband Demystified Technologies, Applications, and System Design Considerations*, River Publishers.

19. Tat-Jen Cham.(2007).Multimedia Modeling Conference, MMM 2007, Singapore, January 9-12, 2007, Proceeding, Springer.

20. Timo Halonen, Javier Romero, Juan Melero. (2004). *GSM, GPRS and EDGE Performance: Evolution Towards 3G/UMTS*, John Wiley & Sons.

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