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## **How Does Matter Lost and Mislplace Items Issue and Its Technological Solutions in 2015 -A Review Study**

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**Abstract:** *At present, the world's population has reached the 7.2 billion; life has become more fast and challenging. Time get more importance than ever before, we need to do multiple task every day. As the life becoming busier the issue of lost and misplaced items is also increase significantly. Today the human life surrounding with machines and technological advancement reshapes the lives. There is need to resolve the lost and misplaced item issue technologically. However, the various studies show the importance of the issue. In recent years number of researchers and small firms work on the technological solution of this issue and offer some good and effective propose solutions and products. Theoretically it's proved that Bluetooth based Devices are the optimal solution for tracking via Smartphone. This regard many small firms offer products. These products are effective, cheap and free of cost to operate. But all these small firms are not able to gain consumers attention. This paper recommends the small companies and the big cellular manufacturers like Apple and Samsung to make the collaboration and offer these products as essential part of Smartphone buying package. Consumers have less confidence to buy the products from small companies if these products are attached with the big cellular companies the products will get the proper attention of the customer. And we also observe that these products features and usability should be properly advertised as the previous studies illustrate that consumers avoid dealing with complex products.*

**Keywords:** *Tracking Devices, Lost and Mislplaced Items, Smartphone, Anti-loss Tracking Technologies*

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### **I. Introduction**

As the 21st century approaches the human life became very fast and busy. The human population reaches 7.2 billion according to 2014 statistic (Population Reference Bureau 2014). The Smartphone industry is boosting by each day to the extent that number of smartphones are estimated to exceed human population in 2014 (Smith A, 2012). To date 5 billion smart devices are connected and it's estimated that 50 billion connected devices in 2020 (Texas Instruments 2013). Technology advancement made our life easy but it the same time our life become more challenging and busy ever before. Due to fast life the issue of lost and misplaced item is also increasing day by day. Many surveys are been carried out by different organization and researches to highlight the lost and misplaced objectives problem. And the same time a lot of solutions are being proposed academically and practically available in the market. But still the issue remains and consumers demand the solution. These solutions are hidden from consumer (Ahmad et. al 2014).

There is intensive demand of tracking devices (Ahmad et. al 2014; Ahmad et. al 2014). We also found that there are lots of tracking devices are available in the market compatible to operate with any smartphone. But still this issue cost much in all around the world. There are a lot of individual and firms offer the tracking solutions which are operated with smartphones. There are also special devices are offered with different accuracy and range. The cost of devices are vary depends upon the tracking technology. But we observe that it's hard to carry multiple devices all the time. So the smartphone based tracking solutions are more useful (Ahmad et al., 2014). And we also found that the Bluetooth tracking system is free of cost and much effective (Ahmad et. al 2014). There many Bluetooth based tracking devices operated with smartphones are offered many small firms. These devices are good, effective and cheaper in cost. Even 2012 iPhone also offer Bluetooth based tracking device named Navior (Ahmad et. al 2014), but according to (Ahmad et. al 2014) almost surveyed audience not aware about such solution and tracking devices offered by iPhone or other small firms. Its mean these devices are not properly advertised through proper channel.

In this article we explore the problem of misplaced and lost objective issue and how it's critical and cost time and money? Different surveys have been carried out at different time and location to highlight the misplaced items issue and give the surprising statistic. Statistic showed that we are wasting 177billions annually for searching the misplaced items, 200000 items are lost by an individual in the entire life. We are wasting on average 16-55 minutes each day, and 1-3 year lost in searching the lost item. And keys are at top of the list in lost items. In upcoming section we will explain the misplaced items issues in detailed and give some silent detail about the different technologies which can be used for tracking. And we will also present the comparison of different technologies the pros and cons for tracking quality and cost. On the bases of issue seriousness and

technological comparison we will present suitable practicable recommendations and conclude all the investigation and solution of the problem.

## **II. Literature Review**

### **Misplaced and lost objectives– how it's serious?**

As our lives becoming more luxurious it's also creating pressure to work more. As a result our life become fast and each day we need to deal with lot of different sort of work. This issue creates the problem of unfocused to a particular task and overall we became unorganized. It's become very common to lost objective if someone unorganized. According to American Demographic Society we can save 16 minutes to one hour a day if we are more organized. Various studies has been carried out to highlight the issue of lost and misplaced items, and results show that now this issue is very common all around the globe. Below we present the different studies regarding lost items issue.

### **Economic losses associated with lost and misplaced item issue**

The loss and misplaced objective issue cause many economic losses we divide these losses into three categories in term of money, in term of time and in term of quantity of loss objectives.

#### **Time**

##### **James Gleick's**

In 1999 James Gleick's wrote the book *Faster* (James Gleick's 1999), in which he wrote that we are spending 16 minutes of each day looking for misplaced items which is almost a year of entire life searching for lost possessions. And most of the things are within our range of search but we couldn't search it on time. Normally we are losing things in our house offices or in the car. Within this much small space we are losing things and wasting our time which is on the average 16 mints of each day this issue is increasing if we are involve in multiple tasks with in certain period of time

##### **Independent news UK**

According to the press release of independent new UK in 2005 this statistic is different than James Gleick's Study. This research is about "The time of our lives: what we spend our days doing today" in which they stated that 31mints in a day we are searching for lost items. Means almost two years of entire life we are just wasting in searching objectives. 31 mints of each day we are wasting at offices and at home for searching the misplaced items and most of the time we are not able to find out these items on time.

##### **Boston Marketing Firm**

In 2004 a Boston marketing firm carried out a survey on American adults and survey results shows that average American 55 minutes of each day looking for misplaced things they are knowing the place but not able to find(Jan Grandprey 2004) . That adds almost 14 days a year and 3 years of people lives consuming to find misplaced objectives.

##### **Article on wellness**

The article of wellness is published in 2009 which based on surveys in the UK and Boston study the estimated range of waste time each day is 31-55 minutes which we are consuming looking for misplaced or lost items (Sandra K Tunajek 2009). According to the article and also quoted by American Demographics, stated that American on the average collectively spends 9 million hours every day searching for lost or misplaced items. Over an average of 60.5 years of stated adult life, that's nearly 200K (198,742) items lost by a British Adults in their entire life and 3,680 hours wasted by a single British, or over 150 days (153.3 days) in the lifetime of a person in UK.

##### **IKEA study on misplaced and lost issue**

IKEA is big name in Chain stores Ikea als carried out a study on lost and misplaced item issue. We are losing many things in our daily life and spending too much time for searching those items. Ikea study provides list of item normally we lost or misplaced in routine life. Among all those item keys is the most common and most lost item according to IKEA. According to the study we spend 16 mints of each day looking for common misplaced item at offices home and cars (Ann McKinney 2001).

##### **Lanna Cairns Survey**

Lanna is a talk shows organizer and working to improve the efficiency of the work. In her personal website she released her study regarding misplaced items in the offices. On the average office employee's consumes 1.5 hours a day which is 1.5 month of a year looking for things in the offices. The typical executive

wastes round about 150 hours in a year which equals to a month, searching for lost objectives or important documents.

### **Wall Street Journal**

In the press release of Wall Street Journal, the study is about office Executive how they are wasting their work time in the offices. The study stated that on the average executives waste 6 weeks annually looking for important documents lost in among the clutter. And an average of 40% of their workday wasted (Ann McKinney), because they were never taught organizing skills to cope with the increasing workloads. The study also reveal that with the better training to improve the efficiency we can get better results from executive and improve the productivity. The study suggest that training program should be conducted with executives teach them the skills of being better organized. This exercise can increase the productivity of executives and companies can get better results

### **Day Runner Survey**

According to the, The Agile Manager's Guide to Getting Organized conducted by Jeff Olson with the name of Day Runner Survey describe that 96% of the targeted respondent indicated if they become more organized they can save time every day. And on average they could save at least 30 minutes each day home (Ann McKinney).

### **Money**

#### **Newsire PR, 2013**

The survey determines that how the wasting of time for searching lost items can cost similar to wasting money. The results show that about 177 billion dollars are wasted annually in the searching of lost or misplaced items on workplaces. It was also stated that office workers waste averaging 30 minutes of their work time per week for searching the misplaced items. The survey also reveals that 37 % of respondents of the study face the problem of being unprepared and lose their concentration due to misplaced things.

### **Lanna Cairns Survey**

If someone earning \$50,000 per year, this loss will be equivalent to \$3,842 per year for s single executive. The waste time for searching lost objective is relatively high in Americans and they consume more than 9 million hours each day looking for lost and misplaced articles.

### **Quantity**

#### **Ensure Home Insurance Study**

In early 2012, a survey at UK present's the lost items issue among the British national. According to the survey, British adults seems to be on the average lost or misplaced almost 200,000 items and 230 days are wasted for searching lost it in their life time by a single person. The majority of people lose their things at home, workplace or in cars, but the ratio is different among different professions to face the problems regarding the misplacement of valuables. The survey also reports that items like Mobile phone, Car keys, Paperwork/ documents, Purse/ wallet; Bank card, Laptop and House keys are amongst the most common misplaced items. Resultantly, these misplaced things not only consume time and efforts for their search but they are also cause of money wastage.

### **FBI Report**

In various major cities, on average people are putting over 200 lost items on daily bases to transit lost and found departments. And Over 110 mobile phones are lost every minute in the United State. FBI also reported that Over 1.5M bicycles are stolen annually, and More than half are recovered by police, but owners of the bicycles often cannot be identified, and only "less than 5% are returned" to their owners (FBI Report 2014).

### **Most Common Lost Item**

According to the Boston marketing firm key is the top of the list among most common lost objectives and on average we are spending 10 mints out of 55 mints we are searching keys every day. And this is also prove by IKEA study that key is the most common lost item and we are spending 6 mints for searching keys out of 16 mints each day.

Conclusion of all above on the average we are losing 200000 items in our entire life (60.5 years).the average range of wasting time is 16-55 minutes every day which is equivalent to the 1-3 years of life time. \$177billion is only wasted in one country (America) for lost or misplaced items issue. Keys are most common lost item among different studies, and averaging 6-10 mints of each day we are spending to searching the keys.

These facts not including the stolen items, although 1.5M bicycles are stolen each year in US and more than half are recovered but only 5% are returned to the owners because of couldn't identify the owners.

#### Communication Technologies for Personal Tracking

There are various technologies can be used for tracking purpose, each of these technologies have their own pros & cons. The below section we give a complete picture of technologies cost and benefits for personal tracking purpose.

#### Outdoor Navigation

The prime schemes which providing outdoor navigation included GPS, however GPS does not support indoors location search and at the same time the place surrounded with high wall infrastructure. In winter or in cold season GPS devices consuming more battery or energy for navigation or localization (Bušić L, Filjar R, 2005). WIFI based localization are required coverage area, heavy processing, more hardware equipment and multiple antennas(Subramanian AP, Deshpande P, 2008). Localization techniques based on GSM technology mainly considering the exact Base Station location known for measurement of signal strength (Besada JA, Bernardos AM, 2007) or required the multiple antennas/receivers for multiple literation(Spirito MA, 2001). The other localization techniques like SMART (Peng Z, Dan W, and Yi S, 2010) worked based on WIFI in addition with onboard resource providing location services like cameras, microphone and accelerometer. Some hybrid system also has been invented which used both WIFI and GPS technologies for localization purpose (Pereira C, Guenda L and Carvalho NB, 2011). The multiple technological techniques based upon WIFI/GSM/GPS also have been proposed by (Papandrea and Michela, 2011). And some other solutions proposed by (Bayir, Ali M, 2009) which based upon global internet architecture. Summary of above technologies requires additional software/hardware resources; services availability, pre-map the war-sensing data (based station coordination or access points) and multiple antennas/sensors ate the users end. So either way, that's a costly solution, host dependent and resources constraint.

#### Indoor Navigation

During last decades, there is great worked has been in indoor localization field and various approaches has been proposed and tested, all these indoor localization techniques have their own pros and cons. According to the pros and cons of each technology we classify them on active n passive scheme principle. N developed a clear picture regarding localization.

#### Active RF Localization

Active RF schemes required specific hardware infrastructure to ensure the highly accuracy for indoor localization, as like cricket (Priyantha NB, 2005), Nokia present the Bluetooth model, and Time of Arrival (TOA) system, like PINPOINT (Youssef M, Youssef A, 2006). The scheme like Link Signature also can be utilize tracking estimation (Zhang J, Firooz MH, 2008), it can identify the variation in parameters link through number of sensors to detect the movement of the item within network. All these Active schemes are very costly applications, and required pre-install infrastructures and it can only cover small area to localize.

#### Passive RF Localization

The technologies which can sense the RF signal by using specific Devices from their surrounding environment are required a particular software/firmware (Bahl P and Padmanabhan VN, 2000) n (Niculescu D and Nath B, 2004). Most of these schemes working under war driven specific area to build a 'fingerprint map' on wireless network base, and localization can be carried out with the real-time fingerprint sensing on a particular device. The most prominent examples is Place Lab where the signals can be mapped from number of GSM and WIFI stations (Chen Y, Chawathe Y, 2005), and RADAR where the Exact location depends on accuracy of WIFI fingerprints (Bahl P and Padmanabhan VN, 2000), but its involve much cost in term of time and hardware. There are some alternative techniques also proposed which present the same idea, for example 'Active Campus Project (Griswold WG, Shanahan P, 2003) its works on predefine WIFI Access Point locations. So we can conclude that Passive Radio Frequency required more resources and predefine 'wireless fingerprints' in a particular area.

#### Active/Passive Behavior Sensing

The assisted source for localization and outwits of context aware processing (Clarkson B, Mase K, 2000) n (Yiu C and Singh S, 2007) same like image matching methods (Elias R and Elnahas A, 2000). Such scheme required decision making objectives (like floor style, furniture etc) foe stability and durability. Some other solutions also have been tested (Fitzpatrick P and Kemp C, 2003), cameras also put in the shoes to get the floor vision. It has been noticed that sort of schemes only amplify the localization information in pre-defined setups, and could not worked as a single source for location estimation.

In short, all these Passive, Active and behavior sensing schemes have some trade-off especially in hardware and software resource, accuracy, energy consumption, platform installation and computational complexity. Most of the above mention techniques required base station coverage or area of war sensing. On the bases of above a comparative model also has been presented by (Ahmad et. al 2014).

	Coverage	Accuracy	Host Dependent	Battery / Power Efficient	Processing	Cost for Tracking?	Main Limitation	
Outdoor Tracking	GPS	Outdoors	meters	Satellites	No	Computational	No	Only outdoors
	GSM	Outdoors/ Indoors	meters	Base Stations	Yes	Computational	Yes	Requires GSM Coverage
	Wi-Fi	Outdoors/ Indoors	meters	WiFi Routers	Yes	Computational	Yes	Requires WiFi Coverage
Indoor Tracking	Active RF	Indoor (limited area)	cm	Pre-installed hardware/ RF Fingerprinting	No	Computational	Yes	Requires pre-configured infrastructure/ measurements
	Passive RF	Indoor (limited area)	cm	Pre-installed hardware/ RF Fingerprinting	No	Computational	Yes	Requires pre-configured infrastructure/ measurements
Behavioral Sensing	Outdoors/ Indoors	Cannot be used as sole localization source					Highly dependent upon surroundings and pre-mapped data	
Bluetooth (via smartphone)	Outdoors/ Indoors	meters	No	Yes	No	No	Only requires a Bluetooth based smartphone and tagged valuables	

Source: (Ahmad et. al 2014a).

Based on above comparative it's pretty much clear that Bluetooth is an optimal technology for personal tracking. On the other hand we also observe that there are a lot of firms offers Bluetooth based tracking facility compatible to operate with any smartphone. In early 2011 iPhone introduce a Bluetooth based tracking solution for valuable items with the name of nlocator (iPhone nLocator by Navior). In June 2013, the "The Tile Apps" which can help to search misplaced item via smartphone (the tile apps 2013). This app can be operated from any smartphone by using Bluetooth. There is another device with name of "XY Tracking Tag" also offering a Bluetooth base tracking facility through cellphone. And "pebblebee" a Bluetooth based IOS tracker available in \$19. And if we talk about "hipkey" is also very useful product available at app store at \$ 59 Bluetooth device. "chiplo apps" another Bluetooth based tracker for smartphone. "Lupo" IOS based Bluetooth tracker. We are able to conclude that there is lot of cheap and effective solutions are available in the market but still this problem increasing year by year as mention in Misplaced and lost objectives– how it's serious? This study for cease this problem and present some fruitful recommendation for companies to properly address the misplaced and lost objective issue.

### III. Conclusions and Recommendations

The problem of lost and misplace items is costing lot of economic losses and on the other hand there are many useful technological solutions are also available in the market. Solutions are hidden from the consumers eyes, means these solutions are not properly commercialized. We also observed that there are lot of small firms are offering very effective tracking solutions but not able to capture the market. We strongly recommend small firms to establish collaboration big cellular giants (i. e. Apple, Samsung, Nokia). Then they will get the proper attention from the consumers. Consumer demands of these tracking devices should be attached with basic mobile phone buying package like chargers and earphones (Ahmad et al. 2014 b).

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