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DEVELOPMENT OF LOW COST PORTABLE ANTI-THEFT DEVICE (PATD)

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***Abstract*—** This paper discussed about the development of low cost Portable Anti-Theft Device (PATD) that able to reduce the issue in snatch-theft, property lost due to leaving it behind, misplace and to monitor the children movement in public area. This device consists of two parts that are the transmitter and receiver controlling circuit which communicate by RFID technology application. It also equipped with a high volume triggering alarm system that activates when the range between the transmitter and the receiver circuits reach a specific distance. It is hope that with this PATD can reduced the issues of theft and snatching crime as well as preventing from loss, injuries and missing.

Keywords—Anti-Lost; RFID controller; RFID receiver,

I. INTRODUCTION

The crime rate in Malaysia shows an increasing trend. The Malaysian government has taken serious action to overcome the issue by recruiting more law enforcement officer and organize tons of campaigns to give awareness to the community on how to avoid and fight crimes. According to the Criminal Index in Lost of Properties in 2008 and 2009 issued by Polis Diraja Malaysia as shown in Figure 1, the snatch theft crime index has jump over 1402 cases in a year [1].

Snatch theft has become one of the fearful crimes among the pedestrian and other road user recently in Malaysia. The differences between this crime compare to other theft is that the robber uses violent force in stealing a women handbag which could cause injury to the victim and even worse, fatality. The increase of cases has bubble outrage among its citizens enough to drive them to apprehend the criminal when opportunity arises. This number has concern many parties because it is not only about the loss of property, but also put the society live in jeopardy.

PATD is developed to help the law enforcement unit to fight the snatch theft crime. The main theme of the device is to produce an alert to the user whenever their belonging is taken away from them by force or by other means.

Furthermore the device is able to inform the user when the belonging item is leaving behind and also perform as a good tracking device to monitor the children movement away from the parents.

PERBANDINGAN JENAYAH INDEKS (HARTA BENDA)

KESALAHAN	TAHUN 2008		TAHUN 2009		-/+	%
	Jenayah Indeks	Kes Per 100,000 penduduk	Jenayah Indeks	Kes Per 100,000 penduduk		
Curi	41,215	149.38	39,874	140.86	-8.52	-5.70
Curi M/Lori/Van	6,263	22.70	5,720	20.21	-2.49	-10.98
Curi Motokar	15,198	55.08	13,888	49.06	-6.02	-10.93
Curi Motosikal	67,359	244.14	61,054	215.69	-28.45	-11.65
Curi Ragut	8,205	29.74	9,687	34.22	4.48	15.07
Pecah Rumah Siang	9,118	33.05	11,396	40.26	7.21	21.82
Pecah Rumah Malam	26,470	95.94	27,060	95.60	-0.34	-0.36
Jumlah	**173,828**	**630.03**	**168,679**	**595.90**	**-34.13**	**-5.42**

Figure 1: Criminal Index in Lost of Properties in 2008 and 2009

II. REVIEW OF SIMILAR DEVICE IN THE MARKET

There are not many devices able to tackle the snatch-theft crime. This could be due to the origin of the crime itself where it happens mostly in South East Asia region. Nevertheless other similar devices are reviewed not only to differentiate them with PATD but also to explore the strength and weakness of other devices.

The Anti-Theft Handbag by *Pacsafe* in Figure 2 consists of slash-proof shoulder strap, tempered proof zipper, snatch-proof anchor clip and snatch guard. Basically the security features added to the handbag is meant to avoid the thief from snatching the handbag, preclude access to the interior of the bag while carrying it and lock the handbag to a secure fixture when leaving it to other place [2]. Even with all safety parts installed on the handbag, *Pacsafe* still maintain the stylish look on it. The drawback of this device is that if a snatcher uses violent force towards the user, it may results a serious damage to the user if safety feature locks the bag to the users.

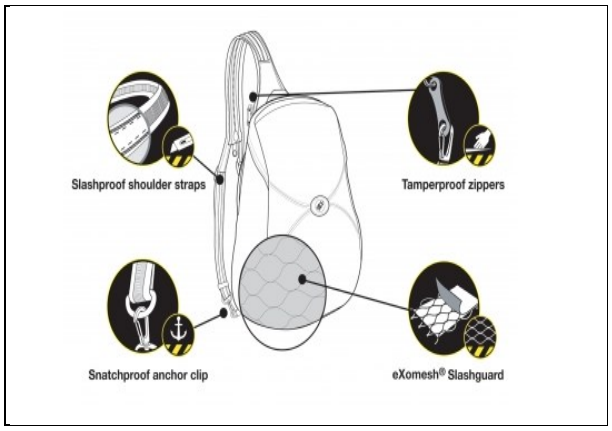

Figure 2: Anti-Theft Handbag by Pacsafe

The Anti-Snatch Device Coupled with means able to transmit SMS message in Figure 3 patented by Gianpaolo in 2003 consist of transmitter, timer and microcomputer with rewritable memory. The device is able to transmit SMS message to a hand phone when it is triggered. Besides sending an SMS, the device also spray an orthicon liquid and produce a high volume alarm when it is triggered. This device offers certain level of protection to discourage any prowlers and send an SMS message to the third party for help [3]. With weakness of this device is that the user needs to manually trigger the device during the event. In many cases, the thief only take a few second to remove a handbag from the user which eventually cost the user dearly of lost belonging.

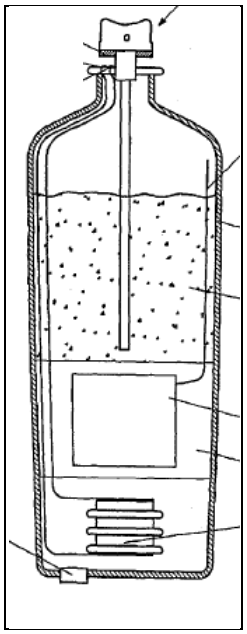

Figure 3: The Anti-Snatch Device Coupled with means able to transmit SMS message

The RF ID for Personal Asset Tracking uses Radio Frequency Identification (RFID) to keep track of the registered object that is within range of the user. It consists of mobile RFID reader and a control program with a graphical user interface. Personal item can be anything from keys, wallet, passport, jewelry and many more. These items will carry an RFID tag that communicates with RFID reader keep by the user. Once the items are far from the FRID, the owner will be alerted [4]. Figure 4 illustrate the basic concept of RFID tracking technology.

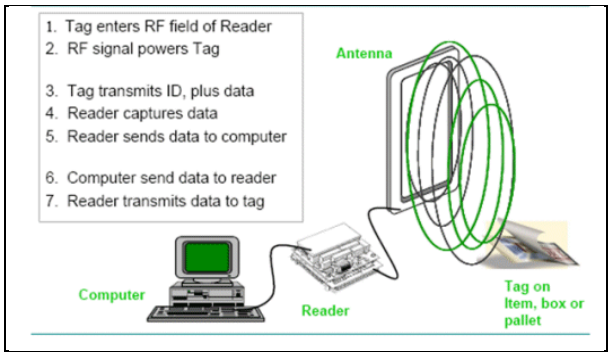

Figure 4: Basic concept of RFID Tracking Technology.

The feature offers by this technology is amazing but the problem is the cost of the complete system is at least 500 USD. It may be utilize for tracking a precious items but it is not cost effective to be used on a low cost belongings.

III. ANTI-THEFT PORTABLE DEVICE

A. Device Construction

The development of the PATD device consists of RF transmitter circuit, RF receiver circuit, alarm triggering circuit and casing. The signal between RF transmitter and receiver is automatically detected as long as the system is switch on. The alarm sounds is capable enough to notify the user and surrounding that something emergency occurs. Table 1 shows the list of component used to construct the PATD device.

Table 1: List of component in the construction PATD

No.	Part	Value	Quantity
1	Resistors	10k	6
		330	1
		130k	1
2	Capacitor	2u	4
3	IC PT2262	-	1
4	IC PT2272	-	1
5	Diode	-	2
6	LED	-	2
7	IC LM7805	-	1
8	Switch	-	2
9	Transistor	-	2
10	Relay	-	1

The idea of the design product is to develop a low cost RFID tracking device with convenient design and friendly user. By developing a low cost device it is expected that everybody affordable to have the device for their safety in daily live activity.

B. *Functionality*

In PATD the distance of signal detection between RF transmitter and RF receiver is specify according to the application. For example, for the purpose of triggering the alarm system for snatching the distance for signal detection is within two meter and for the monitoring children movement the distance can be set more than five meters. To start using this device the user is required to switch on the transmitter circuit and a beep sound will be heard to notify that the device is work and ready to be used. Figure 5 shows the block diagram on the configuration of the PATD and illustrates how the PATD works [6].

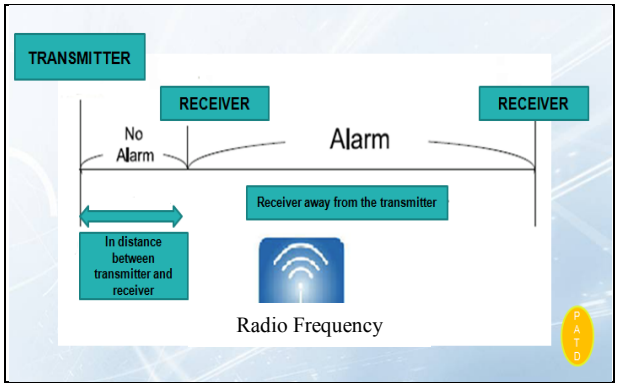

Figure 5 Block diagram of PATD

Based on Figure 5, the alarm is off as long as the specify distance between RF transmitter and receiver retained. As the receiver circuit move away from the transmitter more than the specific distance the alarm is triggered and a high volume sound will be heard. It is only can be turn off by switch off the main controller circuit at the transmitter.

IV. FIELD TESTING

The operation of the device is tested to configure the performance indicator of the designed device. Table 2 shows the operating features of the device when it is implemented.

Table 2: The operating features of the PATD

No.	Operating Features	Rate
1.	RF Module	315 MHz/433MHz
2.	Impedance	1kΩ
3.	Voltage (Alarm)	3V
4	Voltage (Circuit)	9V
5.	Sound Operating Level	103 dB at 1 meter
6.	Duration of the Battery	3 hours

Based on Table 2 the RF modules operating frequency is about 315 MHz to 433MHz and this range ensure that the device is using standard free frequency range. The output of the triggering system also is acceptable at range 103dB to perform as a warning notification to the user.

Furthermore, in order to evaluate the effectiveness of the PATD, the device is tested in three scenarios. The first scenario is where the snatching incident occurred and the triggering system is operated. The second scenario is to test a situation where the personnel belonging of the user is leaving behind and how this device can warn the user. The third scenario is to observe the situation where the receiver is attached to the third party; as it move away beyond the specific distance the alarm system will be triggered.

The results from the field testing in three cases are successful. The alarm from the PATD is automatically triggers whenever the receiver box moves away 1.5m from the transmitter box. Figure 6 illustrate the various purpose of PATD.

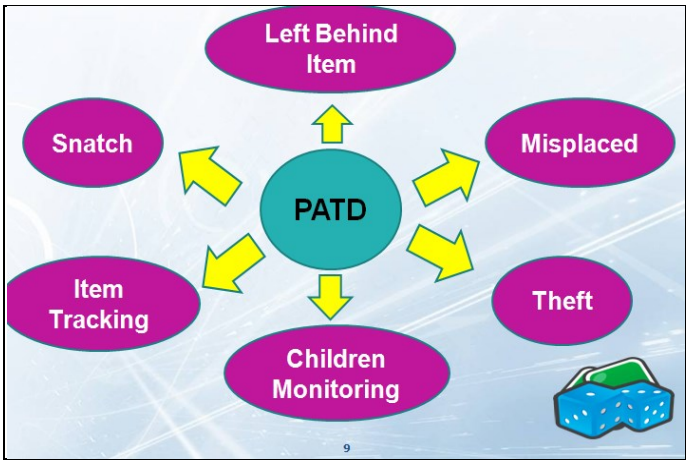

Figure 6: Illustration of the various purpose of PATD

V. MARKET POTENTIAL

The market potential for PATD is enormous. As exclusive handbag company would love to have this device installed with their products, for example Bonia, Bonita and Louis Voitton. Even without the collaboration with the giant company, the civilians can still benefits from this device as part of their safety accessories. Since it is very cheap, the number of people possessing this device is expected to be at par as cell phone

Besides, the Malaysian government has establish Crime Laboratory Partner consist of Law Enforcement agencies, NGO's and Multinational companies that aim to reduce the crime index thru the change in law act, enforcement, technology and campaign.

Figure 7: Crime Laboratory Partner

VI. CONCLUSION

The PATD operates when the receiver box is moving away from the transmitter box. The alarm is triggered to inform the user to take any relevant action. Furthermore the PATD can let people at the surrounding notice that there is emergency happened around and swift action is needed.

The technology use here may not be the most advance way to cope with the issue in hand but without a doubt its capabilities matches GPS tracking system and RFID system. This device not only offers high level protection to the user but also portable, user friendly, multi-purpose and best of feature is the automatic triggering. Not until the GPS tracking system and RFID system developer can make its price to nose dive, the PATD is still the best choice.

Fighting crime is everyone responsibility. If the PATD sounds its beacon for help, Good Samaritan should respond to the call and act smart. There is no telling when will be our time to ask the same favor from other people. This device is indirectly promoting moral values within the society and brings everyone close to each other. A new trend can also grow as it can become an important woman's accessories and essential device for family and society.

VII. ACKNOWLEDGEMENT

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