

群組化之多裝置防遺失警報器

Grouping Multiple Anti-Lost Alarm Devices

A19-019

APPLICATION GROUP A19-019

隊伍名稱 隨身守護天使
Guardian Angel

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研究領域
數位積體電路設計與應用、嵌入式系統設計與應用。

每個家庭皆會有這樣的經驗，當家長帶著自己的小寶貝或毛小孩外出或旅遊時，有時一不注意你的小寶貝或毛小孩就溜煙跑到別的地方玩耍，或遇到壞人把小朋友誘拐走，又或者要出門時，有時候為找手機、鑰匙而四處團轉！當在出差旅遊時，在咖啡廳與展場等公共場所，您的行李箱、筆記型電腦、手機等貴重物品，經常讓你時時提心吊膽，深怕一不注意便會遺失或成小偷的囊中物；以上這些困擾，皆可因本作品「群組化之多裝置防遺失警報器」的推出，幫助大家們解決這種麻煩。

本作品針對市面上防丟器的缺點，開發出另一套創新的防丟器產品，在實際使用上無主、從概念，所有裝置之地位皆相同，只要將產品上電，並將彼此配對成同一群組後，即可開始互相監控。當同一群組中有一個裝置遺失，群組內的所有裝置皆可獲得通知，亦可結合手機追蹤群組中所有裝置，並拍照記錄該裝置的照片來設定名字。當有防遺失裝置遺失時，手機 App 會從畫面關閉的狀態自動打開，並出現警示畫面與警響，且夾帶裝置遺失的照片，讓使用者一看便知裝置遺失之外觀，並可使用雷達掃描功能，以快速的找到遺失物。

本作品為一種多裝置防遺失警示系統與方法，將多個警示裝置設為一群組，在同一群組中的警示裝置相互聯繫，且無主、僕位階之分。當同一群組中有一裝置失聯時，同群組中彼此未取得聯繫的所有裝置便進入警示狀態，以通知彼此未取得聯繫的裝置有成員失聯，以達到群組模式相互提醒，以建構多裝置防遺失之系統及方法。本作品在硬體層、韌體層與軟體層之主要技術如下：

硬體層

- Schematic 進行電路圖設計
- PCB Layout 進行 Layout 設計
- 藍芽廣播&掃描IC：TI CC2541
- 藍芽硬體電路板之天線調適與 50ohm 阻抗匹配、鋰電池充電路設計

韌體層

- IAR Embedded Workbench 進行CC2541 韌體開發
- 藍芽群組建立及加入/退出群組
- 藍芽廣播自己存在
- 藍芽發警示告知同群組的夥伴遺失

軟體層

- 使用 Android Studio 開發
- 掃描所有廣播訊息
- 針對各藍芽裝置拍照圖片之綁定
- 某藍芽裝置失蹤時，App show 出該裝置綁定之圖片



圖 1. 群組化多裝置防遺失警報器之軟_韌_硬體設計架構



圖 2. 群組化多裝置防遺失警報器應用實例

Every family will have this kind of experience. When parents go out with their little baby or hairy children or travel, sometimes they don't pay attention to your little baby or hairy child and go to other places to play, or meet When the bad guys abduct the children away, or when they want to go out, sometimes they go around for a mobile phone and a key! When traveling on business trips, in public places such as cafes and exhibition halls, valuables such as your suitcase, laptop, mobile phone, etc., often make you always fearful, afraid that if you don't pay attention, you will lose or become a thief's bag. All of these problems can be solved by the launch of this group "Multi-device anti-lost alarm".The new design, We develop another set of innovative anti-lost devices for the shortcomings of anti-lost devices on the market. In actual use, there is no concept of master and slave. All devices have the same status. Just power on the products and pair them with each other. After the same group, you can start monitoring each other. When one device in the same group is lost, all the devices in the group can be notified, and all the devices in the group can be tracked by using the mobile phone, and the photos of the device are photographed to set the name. When the anti-lost device is lost, the mobile app will automatically open from the state where the screen is closed, and the warning screen and sound will appear, and the lost photo of the device will be displayed, so that the user can see the lost appearance of the device and can use the radar scan. Features to quickly find lost items.The new design, We proposed a multi-device anti-lost warning system and method, which sets a plurality of warning devices into one group, and the warning devices in the same group are in contact with each other, and there is no division between the main and the servant.

When a device in the same group is disconnected, all devices in the same group that have not contacted each other enter a warning state to notify the devices that are not in contact with each other that the members are disconnected, so as to reach the group mode mutual reminder to construct Multi-device anti-lost system and method. The main techniques of this work in the hardware layer, the firmware layer and the software layer are as follows:

Hardware layer

- Schematic for circuit diagram design
- Layout design for PCB Layout
- Bluetooth Broadcast & Scan IC: TI CC2541
- Bluetooth antenna board antenna adaptation and 50ohm impedance matching, lithium Battery charging circuit design

Firmware layer

- IAR Embedded Workbench for CC2541 firmware development
- Bluetooth group creation and joining/exiting groups
- Bluetooth broadcasts itself
- Blue Bud warning to inform the partners of the same group

Software layer

- Develop with Android Studio
- Scan all broadcast messages
- Binding pictures for each Bluetooth device
- When a Bluetooth device is missing, APP show the picture bound to the device