The Research and Implementation of Anti-theft Monitoring Alarm System Based on MTK

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Abstract—**As a cost-effective mobile development platform, MTK support the functions of recording video and sending multimedia message. In this paper, an anti-theft monitoring alarm system based on MTK is proposed and implemented. The design based on a high performance MTK chip of MT6226. The sensors and the alarm device attached to MT6226 through the interface of GPIO. Once one of the sensors detect abnormal signal, MT6226 call the thread of recording video, driving the alarm device. Then the MTK send a multimedia message which compressed by the video to the master. The experiment results show that the anti-theft monitoring alarm system based on MTK platform have achieved good performance on cost-effective and flexibility, which make up for the inadequacy of existing monitoring systems.**

Keywords- MTK, Multimedia message, MT6226, Monitoring system

I. INTRODUCTION

As an important part of security facilities, the monitoring system is playing an increasingly important role. But at present, there exist too many disadvantages in domestic security monitoring systems such as high cost , short transmission distance, deep dependence on PC and high demand on storage space. To make up for the inadequacy of existing monitoring systems effectively, this paper puts forward a solution of intelligence anti-theft system which is cost-effective, low power consuming, independent work and support remote MMS controlling . The author introduce the hardware and the software of MTK first, then gives the overall structure of the monitoring system, introducing a flow chart to achieve this function, and finally discussed fully the functions of the MTK platform for videoing, timing, sending multimedia messages and external interruption. The results showed that the scheme is feasible and it's worth promoting.

II. MTK SYSTEM

A. Hardware Platform

MTK is the abbreviation of MediaTek. MTK mobile phone developing platform is the most popular and complete system used by domestic mobile phone designers and manufacturers now. Its high cost-effective and the characteristics of secondary development may be highly favored by handset manufacturers. MT6226 chip this project select is a leading edge single-chip solution for GSM/GPRS mobile phones targeting the emerging applications in digital audio and video. Based on 32-bit ARM7EJ-STM RISC processor, MT6226 not only features high performance GPRS Class 12 MODEM, but also provides comprehensive and advanced solutions for handheld multi-media. To provide complete user interface, MT6226 brings together all the necessary peripheral blocks for multi-media GSM/GPRS phone. The peripheral b locks consists of the Keypad Scanner with the capability to detect multiple key presses, SIM Controller, Alerter, Real Time Clock, PWM, Serial LCD Controller, and General Purpose Programmable I/Os. For connectivity and data storage, the MT6226 supports UART, IrDA, USB 1.1 Slave and MMC/SD/MS/MS Pro. Furthermore, for large amount of data transfer, high performance DMA (Direct Memory Access) and hardware flow control are implemented, which greatly enhances the performance and reduces MCU processing load[1].

B. Software System

MTK provides a set of powerful, stable software platform, which support secondary development for the security[6], manufacturing and other fields.

1) Operating System

Nucleus OS of MTK is a real-time preemptive and multitasking operating system, on which an software interface named KAL OS (Kernel Abstraction Layer) is designed for providing the system services ,such as timers, queues ,and memory management, for the MTK tasks .

2) Basic Software Architecture

The MTK system software architecture, it mainly consists of RMI (Remote MMI), MMI (Man Machine Interface), L4 (Layer 4), Drivers and PS/L1 (Protocol Stack / Layer 1)[2] . MTK software architecture can be divided into

different functional modules of each layer. MMI as the core of MTK system's secondary development, the overall structure as Figure 1.
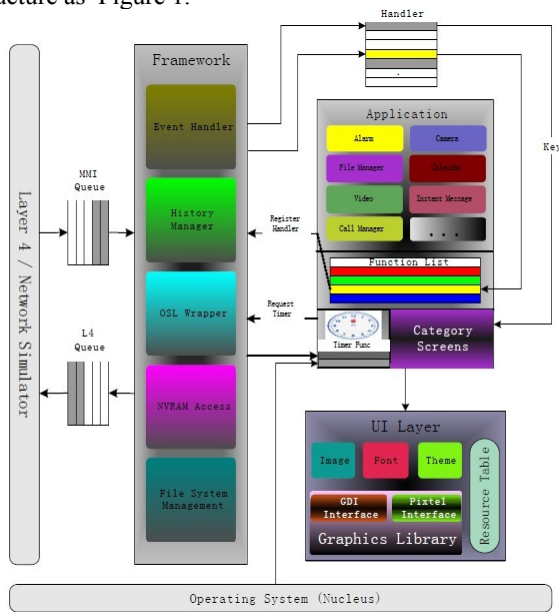

Figure 1.   MMI structure of MTK platform

Figure 1 shows that MMI consists of four layers: FrameWork layer, the communication layer between MMI and the L4 level, Application layer, and UI Layer [5].

III.   OVERALL FRAMEWORK OF THE SYSTEM

The sensors and the alarm device attached to the MT6226 through the interface of GPIO. Once one of the sensors detect abnormal signal ,the trigger circuit of the interface sends a pulse signal to MT6226,which will cause MT6226 to call the thread of recording vidio and driving the alarm device. At the same time , the MTK send a multimedia message which compressed by the video to the master.
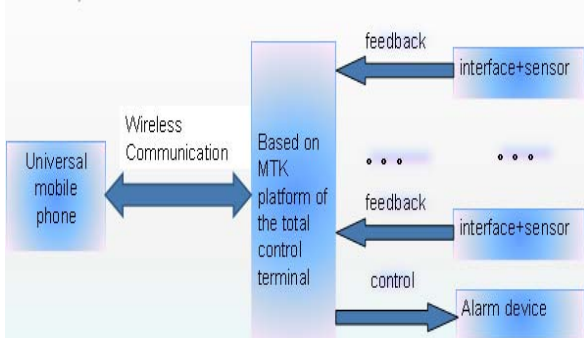

Figure 2.   Overall framework of the anti--theft alarm system monitoring based on the MTK platform

IV.   IMPLEMENTATION OF THE MAIN FUNCTIONS

A.   FUNCTIONAL FLOW CHART

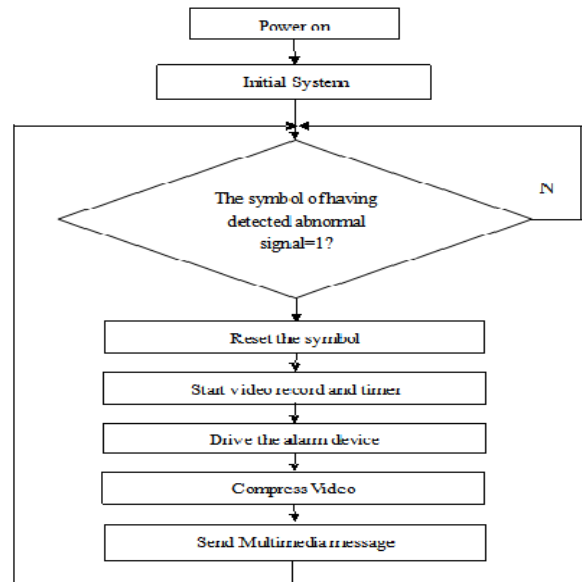The following figure shows the anti-theft alarm system function monitoring the flow chart:

Figure 3.   anti-theft alarm system monitoring functions to achieve a flow chart

B.   CORE MODULES

1) Timer[4]

Timer event is a specified event to be trigged at the specified time or at the specified time   interval , which realized by a function registered in the system. The timer event in anti-theft alarm system realized as follows:

1) Define a MMI_TIMER_IDS type TimeID named RECORDING_TIMER_ID.

2) Call the function as "StartTimer(U16 TimerID,U16 delay, FuncPtr)" to start a timer. The parameter "TimerID" is the TimeID defined in step 1), the parameter "delay" is the time interval, the parameter "FuncPtr" is the procedure called at the specified time interval. The function in anti-theft alarm system as follows: "StartTimer (RECORDING_TIMER_ID, 5 * 1000, capture_and_send_message)", of which "5 * 1000" is based on MT6226 chip operating frequency and set timer recording time in 1000 in the MT6226 is the 1 second timing. "capture_and_send_message" is the function of preparing for the video and sending a multimedia message to the universal mobile phone of the master.

3)Call the function as "StopTimer(U16 TimerID)" to stop a timer. The function in anti-theft alarm system as follows: StotTimer(RECORDING_TIMER_ID).

2) Video Recording

As a mobile development platform, MTK has the same multimedia function as ordinary mobile phone, in which video recording is one of the most important part. The anti-

theft alarm system make full use of this feature to collect important video evidence. When MTK platform receive the abnormal sensors signal, the program start the timer, and in the callback procedure "capture_and_send_message" call the system function "mmi_vdorec_entry_app", by which realize video recording.

3) Mms Communication

The anti-theft alarm system need to send a multimedia message which compressed by the video to the master.The multimedia message service module loaded in "\plutommi\mmi\JataayuApp\JMMSMMI"[3], which realized by JMMSWriteMMSUI.c as follows:

```
void send_vedio_mms(void)
{
//(1)Insert the number of guest mobile phone
mmi_jmms_entry_write_message_add_number();
mmi_jmms_address_search_phonebook_or_ok();
mmi_phb_entry_mms_choose_number();
mmi_jmms_address_search_phonebook_or_ok();
//(2)Insert the recording video
mmi_jmms_insert_record_vedio();
//(3)Edit the multimedia message
mmi_jmms_done_write_mms();
//(4)Send the multimedia message
mmi_jmms_pre_entry_write_mms_done_send_only();
}
```

4) External Interrupt Function

MTK6226 supports four external interrupt request , which can be used for different applications, such as detecting hands-free connection, opening the hood, charging battery etc. Response to an external interrupts as following steps:

(1) Register the interrupt function

void EINT_Registration (kal_uint8 eintno, kal_bool Dbounce_En, kal_bool ACT_Polarity, void (reg_lisr) (void), kal_bool auto_umask)

// Parameter description:

// " eintno": Interrupt number

//"Dbounce_En":Enable the Debounce function or not;

//"ACT_Polarity" : interrupt polarity;

// "reg_lisr" :The interrupt response function;

//" auto_umask ": The corresponding flag is set automatically or not after //the interrupt response

The register function called in anti-theft alarm system is as follows: EINT_Registartion (4,1, eint_state, eint_respond_func, 1); "eint_respond_func" is the interrupt response function.

(2) Realize the interrupt response function

```
void eint_respond_func (void)
{
    start_stores ();// start the timer timer recording 5s
    drive_alarm ();// 15s drive alarm continue to work
    send_mon ();// MTK total control terminal set to the client number to send SMS alarm report
}
```

V. EXPERIMENTS

An infrared detector based on the principle of Fresnel lens was attached to the GPIO0 of MT6226 .When somebody close to the infrared detector, the MTK platform starts recording video for 15 seconds and sending high power level on GPIO43 by which drive the alarm device to work, then send a multimedia message compressed from the short video to the master in 2 seconds. But when a book or other non-heat-release objects appeared close to the infrared detector, the platform did not alarm.

VI. CONCLUSIONS

In this paper , an anti-theft monitoring alarm system is presented and designed, which can alarm and send MMS to the master. The design give full play to the function of MTK platform: The recording video module of MTK is used to save the Evidence directly, the MMS module of MTK is used to inform the master, and the experiment results show that the anti-theft monitoring alarm system based on MTK platform have achieved good performance on cost-effective and flexibility, which make up for the inadequacy of existing monitoring systems.

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