

**METHODS AND DEVICES FOR OPERATING
MOBILE TERMINAL ALARM CLOCK
UNDER SHUTDOWN STATE**

RELATED APPLICATION

This application is based upon and claims the benefit of Chinese Patent Application No. CN201210291619.3, filed Aug. 15, 2012, the entire contents of which are incorporated herein by reference.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The disclosure relates to the technical field of mobile terminals. Specifically, the disclosure relates to methods and devices for actuating an alarm clock when a mobile terminal is under a shutdown state.

2. Description of the Related Art

With the development of mobile communication technologies, mobile terminals, such as mobile phones, have become an essential communication tool for people. An alarm clock is a feature in a mobile phone (cordless telephone) that is frequently used. However, there are some mobile phones which do not implement functionality to activate the alarm clock when the mobile phones are under a shutdown state (i.e., the mobile phone is turned off).

The majority of existing implementations for activating an alarm clock when a mobile terminal is under the shutdown state use a local RTC (Real time clock). For example, some models that use local RTC add a dedicated timing chip outside a baseband chip that interacts with the timing information of the processor of the mobile terminal. In another example, some models that use local RTC count pulses generated by an oscillating circuit inside the baseband chip.

These types of circuits for awakening an alarm clock when a mobile terminal is turned off, however, are unable to be implemented in mobile terminals that adopt Android™ operation system.

SUMMARY OF THE INVENTION

The present disclosure provides methods and devices for activating an alarm clock when a mobile terminal is under a shutdown state, thereby bringing better user experiences to a user.

According to an aspect of the present disclosure, a mobile terminal may comprise at least one non-transitory storage medium and at least one executing unit. The at least one non-transitory storage medium may comprise an application for operating an alarm clock function when the mobile terminal is off. The at least one executing unit may be in communication with the at least one non-transitory storage medium that is configured to execute the application and may be configured to receive a target alarm clock activation time; determine a first time difference between a current time and the target alarm clock activation time; and compare the first time difference with a first reference time period. When the time difference is less than the first reference time period, the at least one executing unit may be configured to execute a startup operation; receive a startup-completion time when the startup operation is completed; determine the startup-completion time to be an actual alarm clock activation time; and execute an activation operation to the alarm clock at the actual alarm clock activation time.

According to an aspect of the present disclosure, to determine the startup-completion time to be the actual alarm clock

activation time, the at least one executing unit may be further configured to determine a second time difference between the startup-completion time and the target alarm clock activation time; and compare the second time difference with a second reference time period. When the second time difference is less than the second reference time period, the at least one executing unit may be configured to search a state of the alarm clock within the second reference time period from the target alarm clock activation time; and determine the startup-completion time to be the actual alarm clock activation time when the state of the alarm clock shows that the alarm clock has not been activated.

According to an aspect of the present disclosure the at least one executing unit may be further configured to execute no alarm clock activation when the second time difference is more than the second reference time period; or the state of the alarm clock shows that the alarm clock has been activated within the second reference time period from the alarm clock activation time.

According to an aspect of the present disclosure, the at least one executing unit may be further configured to set the target alarm clock activation time when the mobile terminal is on; and store a ring tone associated with an alarm clock in one of the at least one storage medium when the mobile terminal is under the turn-on state.

According to an aspect of the present disclosure, the at least one executing unit may be further configured to copy the ring tone from a Secure Digital card of the mobile terminal. The Secure Digital card may not be accessible for the at least one executing unit when the mobile terminal is off. The one of the at least one storage medium may be accessible for the at least one executing unit when the mobile terminal is off.

According to an aspect of the present disclosure, the at least one executing unit is further configured to receive an instruction to the activation operation from a user of the mobile terminal; and execute the instruction to the activation operation, wherein the instruction for processing the activation operation may be sliding of a designated object of the mobile terminal from a designated initial position of the mobile terminal to a designated target position of the mobile terminal over a pre-defined path. The instruction to the activation operation may comprise one of terminating the activation operation, continuing the activation operation, terminating the activation operation and resume the activation operation after a pre-determined period of time, and terminating the activation operation and turning off the mobile terminal.

According to an aspect of the present disclosure, the mobile terminal may be operated under an Android™ operation system.

According to an aspect of the present disclosure, a method for activating an alarm clock application when a mobile terminal is under a shutdown state may comprise receiving, by a mobile terminal, a target alarm clock activation time; determining, by the mobile terminal, a first time difference between a current time and the target alarm clock activation time; and comparing, by the mobile terminal, the first time difference with a first reference time period. When the time difference is less than the first reference time period, the method may comprise executing, by the mobile terminal, a startup operation; receiving, by the mobile terminal, a startup-completion time when the startup operation is completed; determining, by the mobile terminal, the startup-completion time to be an actual alarm clock activation time; and executing, by the mobile terminal, an activation operation to the alarm clock at the actual alarm clock activation time.

According to an aspect of the present disclosure, the determining the startup-completion time to be the actual alarm