

Crazy Alarm Clock

Description

The goal of the project is to build an alarm clock with creative snooze options to help people get out of bed in the morning without hitting snooze excessively. The alarm clock will accomplish this by escalating its snooze tactics from the standard beeping, to cognitive puzzles, all the way to the clock physically running away.

Features

The alarm clock will have 3 stages as well as some standard features. Additional stages can be added if time permits. Because of the nature of the stages and features, the project can be built modularly and combined into the final product. Components or stages that prove too complicated or too simple can be easily modified and still fit into the final product, allowing us flexibility over the course of the semester.

Stages

1. Play a repeating tone
2. Require a simple version of the simon game to be won
3. Run away

Features

- Military clock
- Set alarm time
- Set minutes between snoozes
- Choose tone
- Turn alarm on/off
- Snooze

Hardware Components

LCD Display

Rocker/toggle switches

Buttons

[Adafruit Trellis](#)

Piezo buzzer

DC gearmotors

H-bridge

Enclosure and Wheels

Software Implementation

We will use Timer A for the piezo buzzer as well as button debouncing, Timer B for the PWM signal to drive the h-bridge, and the Real Time Clock for the military clock, alarm time, and snooze time. Buttons and switches can be debounced using interrupts, whereas the Trellis will use an I²C connection. The DC motors will be controlled through the h-bridge, utilizing PWM and enable signals to allow it to change speed and change direction.

Program Flow

The military clock will always display, and the device will be in sleep mode until awoken by an interrupt. Interrupts will occur either to set a feature, or it will be triggered by the alarm. When the user presses the set button, the device will go into set mode, through which the user can set the time, alarm time, snooze duration, and alarm tone. Alternately, when the alarm goes off for the first time, the device will play the specified tone until the snooze button is pressed. The second time the alarm goes off, the device will go into game mode which will repeat until the user wins the game. In the second stage, winning the game is the only way to snooze the alarm. The third time the alarm goes off, the device will play the specified tone and run away until the alarm is turned off. The third alarm does not have a snooze feature, as the user is already out of bed. At any point, the user can toggle an alarm on/off switch to turn the alarm on or off. During all stages, if the switch is turned off then the stage will end immediately.

Project Division

Main programmer – William Diehl

- Building a state machine for the stages and features of the program
- Setting up the real time clock and alarm/snooze set features
- Combining all parts of the project into one program

Secondary Programmer – Cong Chen

- Programming interrupts
- Debouncing buttons and switches
- Interfacing with the piezo and programming the tone set feature

Robotics Lead – Lakshmi Meyyappan (Project Lead)

- Driving motors with H-bridge
- Connecting power
- Building enclosure and attaching wheels
- Vector boarding and assembling final circuits

User Interface Lead – Alex Kaye

- Interfacing with the keypad/Trellis
- Interfacing with the LCD display and creating views for each stage
- Building the stage two simon game