ERGONOMIC ALARM CLOCK

Assignment 1 — Control Redesign

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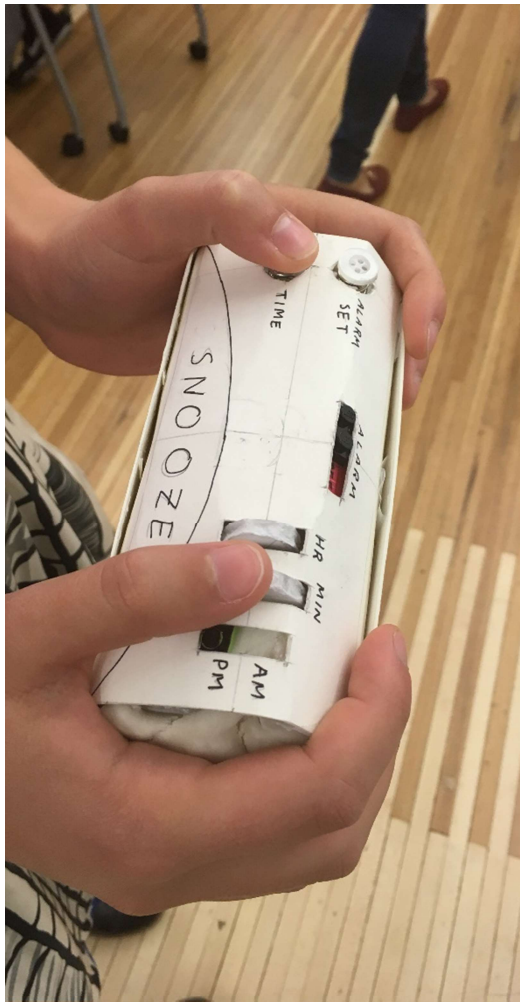
IXDS1, Section A

PURPOSE

Over the course of this project, I found an object with poorly designed controls—my digital alarm clock—and redesigned those controls with an eye toward improved perceptual affordance, feedforward, and feedback.



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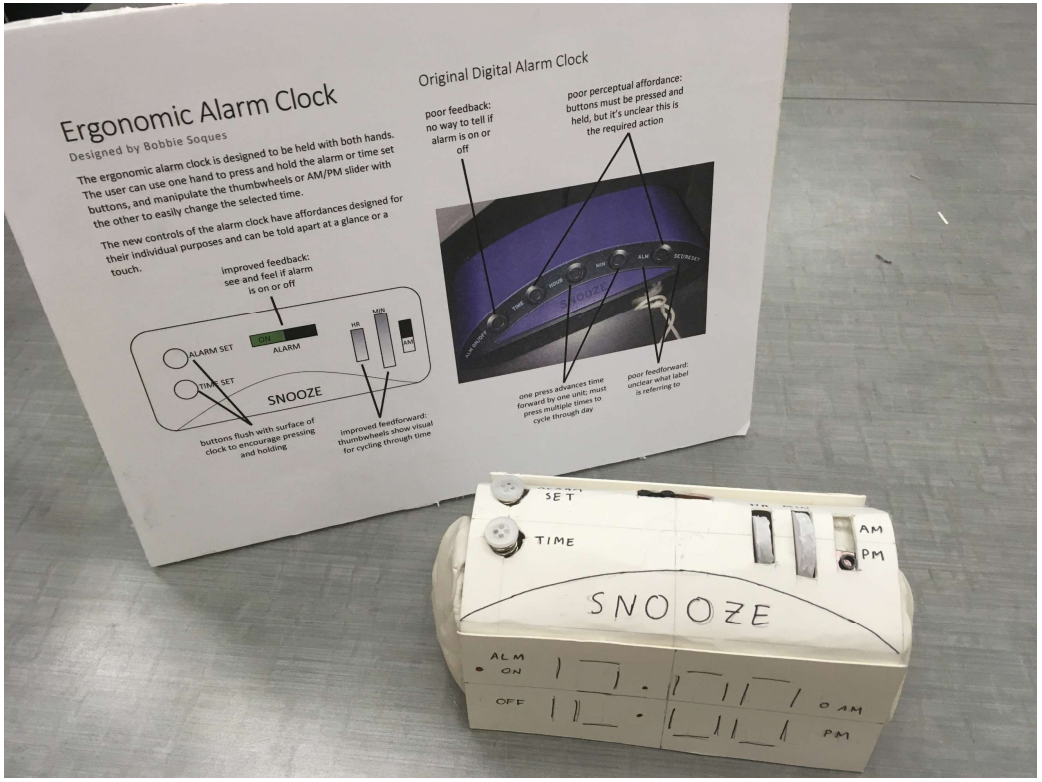
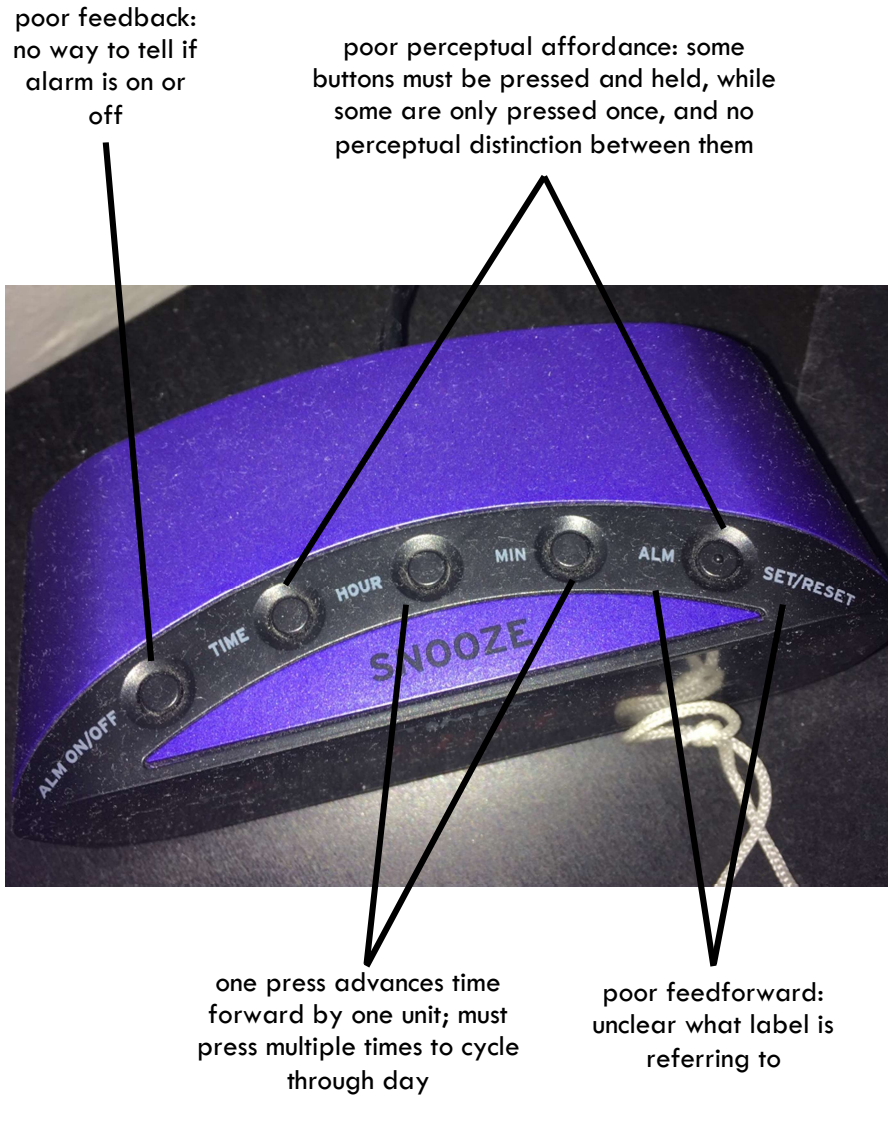


Research

I began my research by reading literature on effective and ineffective control design. I then examined my environment to find examples of poor control design that I could improve. I looked for problems with perceptual affordance, feedforward, and feedback.

A well-designed **affordance** Looks like it should be used in the way it is meant to—for example, button is for pressing and a knob is for turning. **Feedforward** alerts the user to what will happen once they interact with the control, like a label on a button. **Feedback** lets the user know that they have successfully interacted with the control, such as the audible *click* when a button is pressed or a display changing.

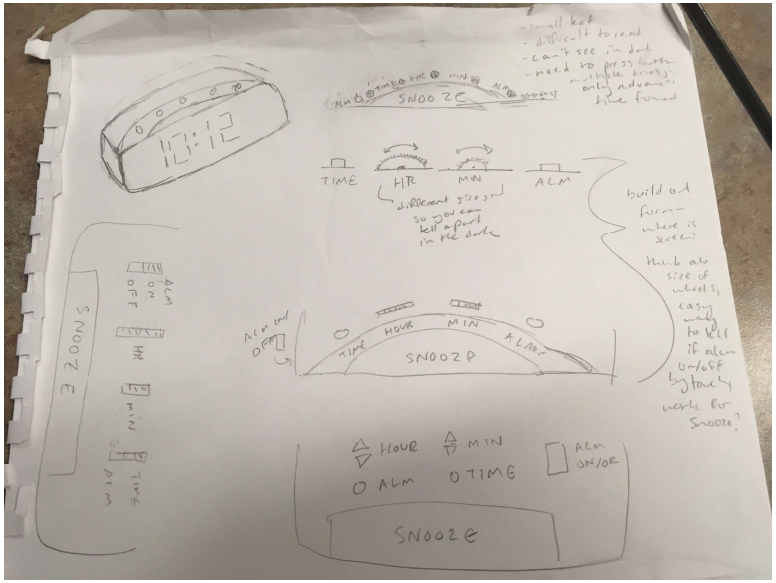
I decided on improving my digital alarm clock, whose controls are so poorly designed that I actively avoid using them. The primary areas of improvement I identified were the hour and minute controls, as well as the Alarm On/Off button. Pressing the hour and minute buttons multiple times to cycle through time is tedious and tiring, and there is no way to tell if the alarm is on or off besides the front display.

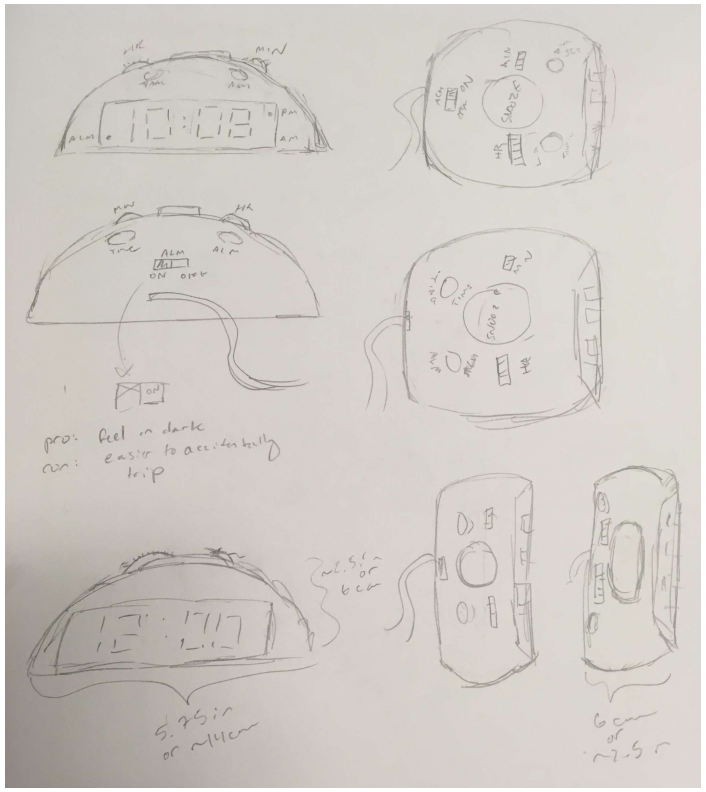


Ideation

After identifying the problematic aspects of the alarm clock's designs, I began sketching ideas for an improved alarm clock, which are pictured and summarized below.

- Arrow buttons for the hour and minute adjustment, so that the time can be adjusted in more than one direction.
- Thumbwheel for controlling hour and minute adjustment, as it lets the user quickly cycle forward and backward in time with minimal effort.
- Discrete binary sliding switch for alarm on/off control, as it tells the user the current state of the alarm both visually and by touch (for, say, a half-asleep user).



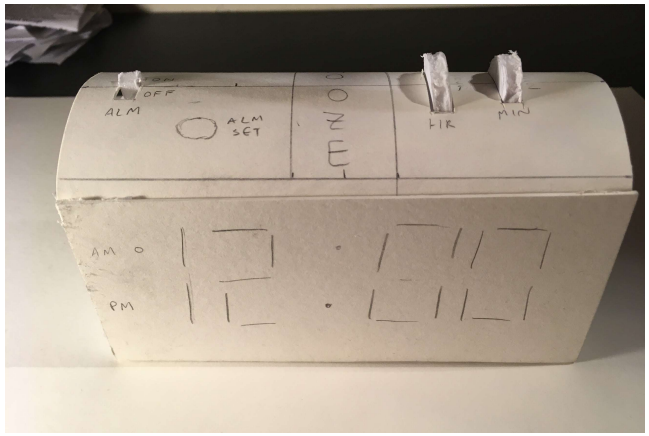


I experimented with locations for these controls as well as the controls I didn't focus on improving (the Time and Alarm Set buttons, and the snooze button). I also experimented with the overall shape of the clock, including a rounded shape to echo the shape of the thumbwheels.

Iteration — Phase 1

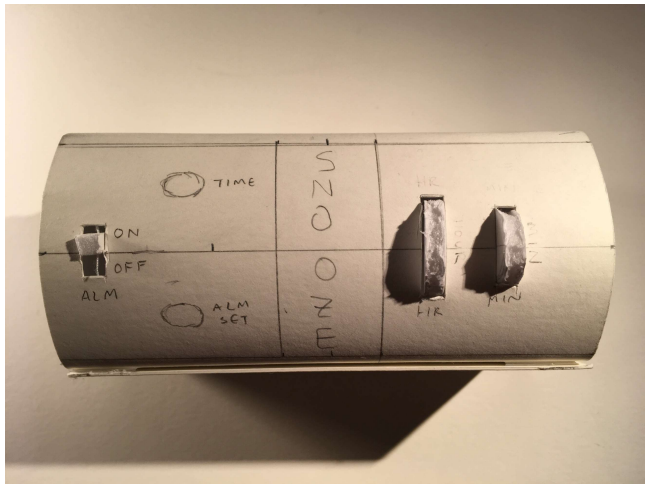
Design

In my first iteration, I attempted to make a working model of my favorite control options from my initial sketches—the thumbwheels for the hour and minute, and a sliding switch for the alarm on/off.



The hour thumbwheel was bigger than the minute thumbwheel to reflect the fact that an hour is a larger increment of time. Unfortunately, he slider had to be held between finger and thumb to move, rather than be pushed with a single finger like I had intended.

The placement of the controls was mostly out of convenience, and to make it visually balanced. The top of the alarm clock was curved to follow the curve of the hour and minute thumbwheels.

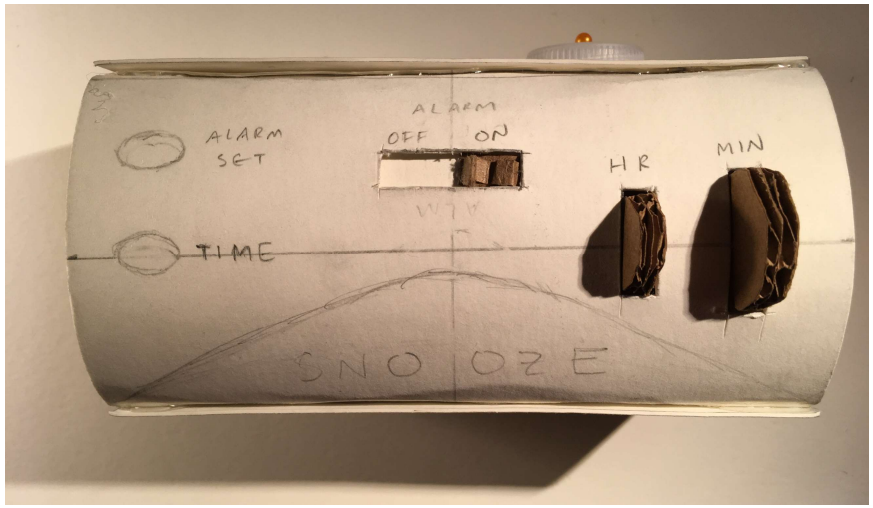


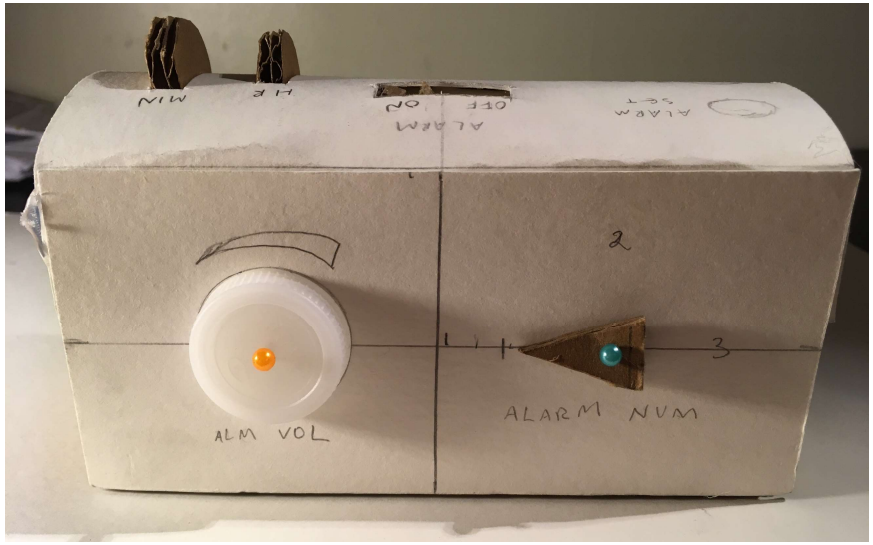
Critique

I received positive feedback on placing all the controls on the top, since they could all be seen at once, and the curved design of the top. My classmates also liked the thumbwheels for the hour and minute, although some of my critics thought the sizes should be flipped, reflecting the size of the hour and minute hands on an analog clock. Some critics worried about accidentally hitting another button or control while reaching for the snooze button.

Suggestions for improvement included adding the ability to set more than one alarm, an alarm volume control, and the addition of color and light feedback to the alarm on/off sliding switch.

Iteration — Phase 2





Design

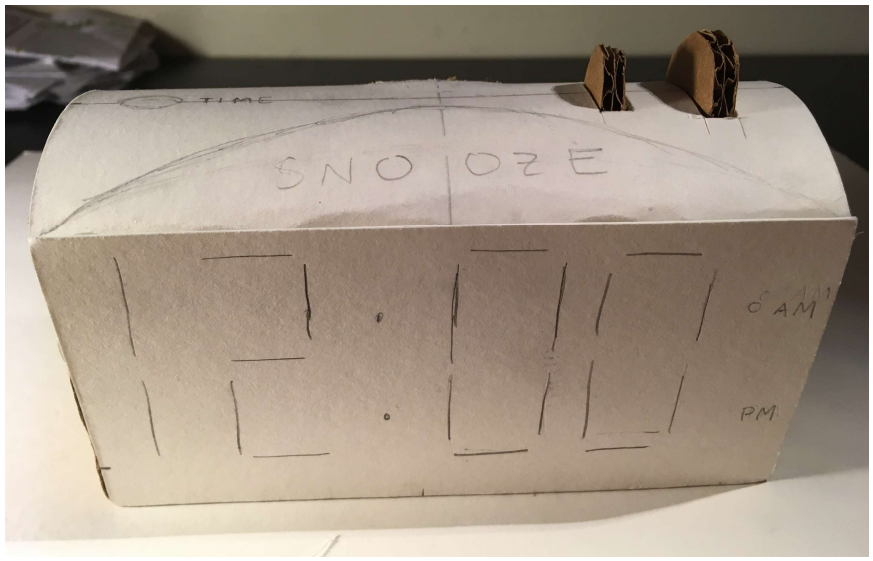
My second iteration added additional features based on the feedback from the first prototype, including a dial to select multiple alarms and a knob for volume control. The size of the hour and minute thumbwheels was switched, although their positions remained the same—the hour on the left and the minute on the right, to reflect how they're displayed on the clock face.

The snooze button was moved to the front of the control panel and its size increased, to make it easy to reach from either side of the clock without hitting any other buttons. The alarm on/off switch was subsequently moved above the snooze button and oriented horizontally, where it could fit on and visually balance the interface. The switch itself was redesigned to be inset and ridged, so it could be pushed with a single finger.

Critique

While my classmates liked being able to set multiple alarms, they were confused by the dial to select each alarm. The relative sizes of the hour and minute wheels received positive feedback. I noticed that the alarm or time could be easily set while holding the clock in both hands, where the left thumb could reach the buttons and the right thumb could manipulate the thumbwheels.

Suggestions included adding additional feedback to the alarm on/off control by displaying the alarm's state on the front of the clock and editing the shape of the clock sides to encourage users to hold it with both hands.



Iteration — Phase 3

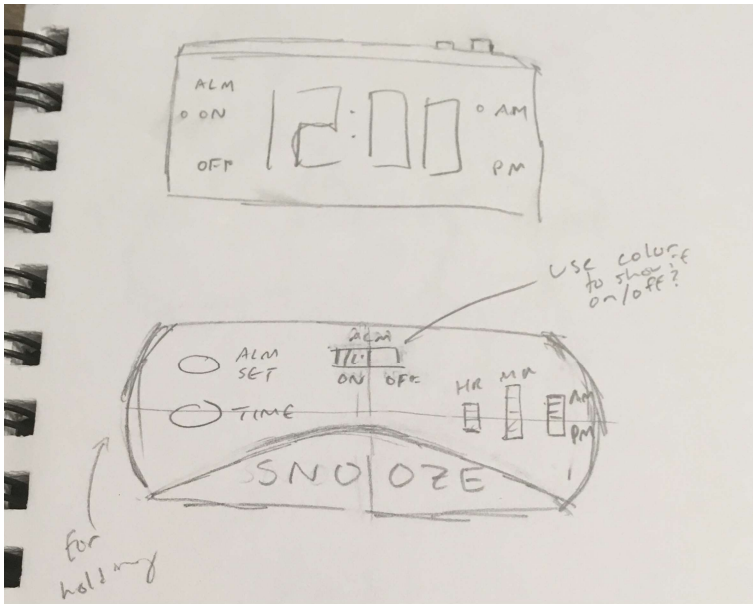
Design

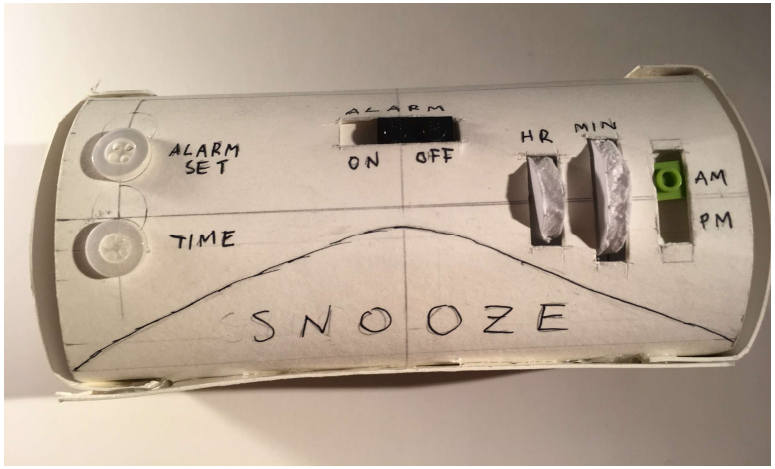
The third iteration incorporated the suggestions from the previous iteration and critique. I added an alarm on/off display to the front of the clock and added rounded sides make it comfortable to grip the clock in both hands.

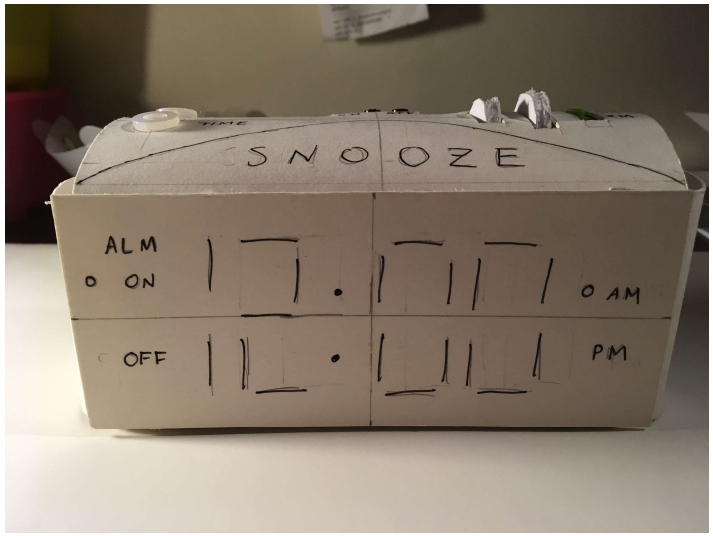
I also added an AM/PM binary switch, similar in design to the alarm on/off switch, to make it even easier to set the time or alarm. I placed it next to the hour and minute thumbwheels so that the visual layout of the controls matched the visual layout of the time on the display.

I changed the sliding switch material to Legos, which are sturdy, offer a raised surface that can be easily pushed, and can be differentiated by touch (one versus two raised circles). The drawn-on buttons for the time and alarm setting were replaced with real buttons, to replicate the concave surface of a button that would encourage users to press it.

I dropped the volume knob and multi-alarm dial from the design, since they added extra work for me and confusion for the user. Plus, this project is about redesigning a few specific controls, not improving the overall functionality or features of the object.







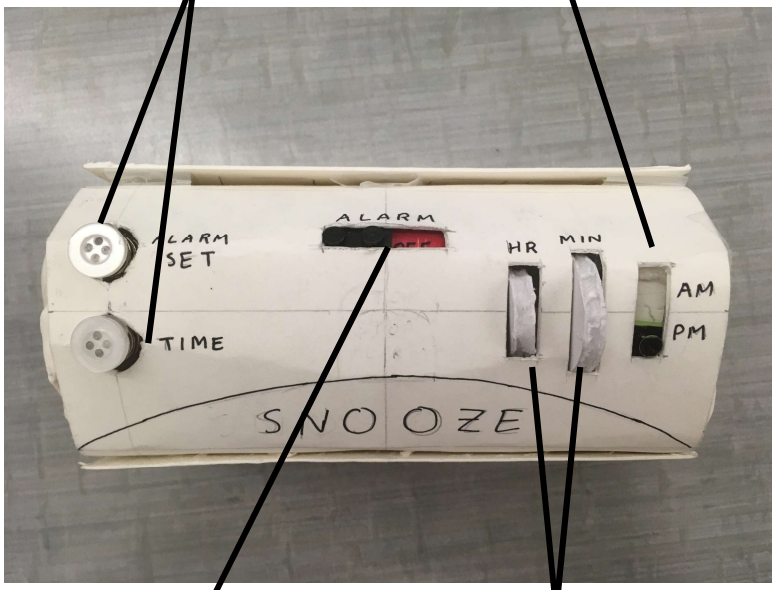
Critique

I received positive reactions to the improved form factor of the alarm clock, and it was suggested that I carry the concept even further by creating ergonomic grips from clay or foam for the sides of the clock. My classmates were also impressed by the AM/PM switch, and thought it was in a good location. One user suggested adding color for the alarm on/off switch underneath the sliding control itself, and putting the label there as well, since I was struggling to incorporate color feedback without confusing the user.

Some users thought that the alarm and time set buttons were one-touch rather than press and hold, due to being raised from the surface. I had left the alarm and time set buttons as press and hold intentionally to prevent users from accidentally hitting the button and changing the time or alarm, so I needed to communicate that interaction better through the buttons' perceptual affordance.

Final Design

The final design incorporates the feedback from all past iterations, as well as improved functionality overall. The features of the new ergonomic alarm clock are summarized below.

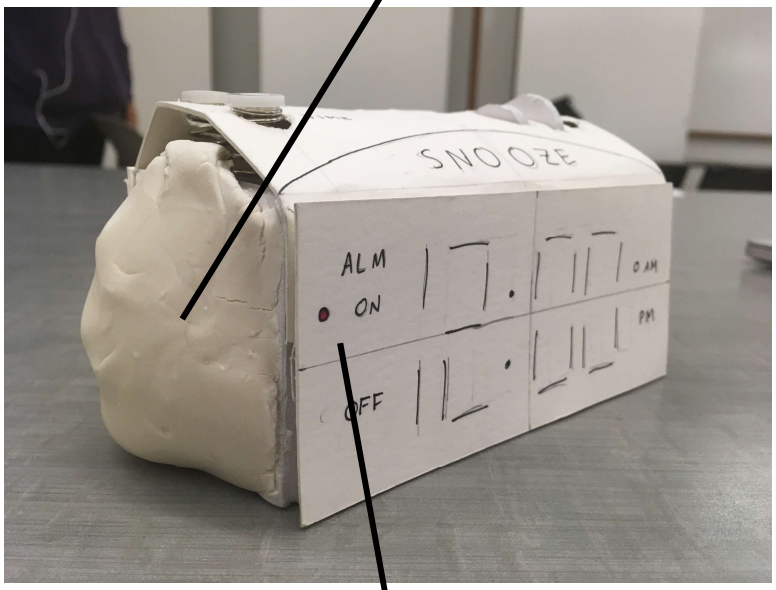


functioning press and hold buttons (on springs)

additional feature: functioning AM/PM switch

improved feedback: alarm on/off switch with color and text labelling

improved feedforward: functioning hour and minute thumbwheels



perceptual affordance: ergonomic grips made of clay

alarm on/off shown on front display