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COP 4934 Senior Design 1

Assignment: Design Thinking Mini-

Challenge

8-27-2025

Select a problem:

Enhancing roommates' sleep while in the dorm

Empathize:

Having roommates often tend to involve disturbing each other's sleep. Especially if they have different bedtimes. Many times, the schedule of two roommates is completely different, one may have to sleep early, and the other might have to stay up late. The early bird might be disturbed by the night owl's work. On the other hand, the night owl might get disturbed by the early alarm, waking both up. This problem affects the physiological need for sleep and the social need as it can create a lot of strife with each other.

Define:

Users want a solution or product that is easy to use, affordable and comfortable. The users want to go around trying to communicate with each other and changing their schedules to fit around the sleep schedule. They want functionality that can block out all light from within the dorm and wake the user up without waking up anyone else.

Ideate:

possible solutions include

Scheduling or questionnaire software to coordinate or negotiate sleeping and waking up times. This would include having users answer questions of when their typical times are that they need to stay late or go to bed. In addition, processing the data collected to negotiate a common time. This solution would help roommates be able to negotiate, however it leaves the undesired solution of changing the schedule.
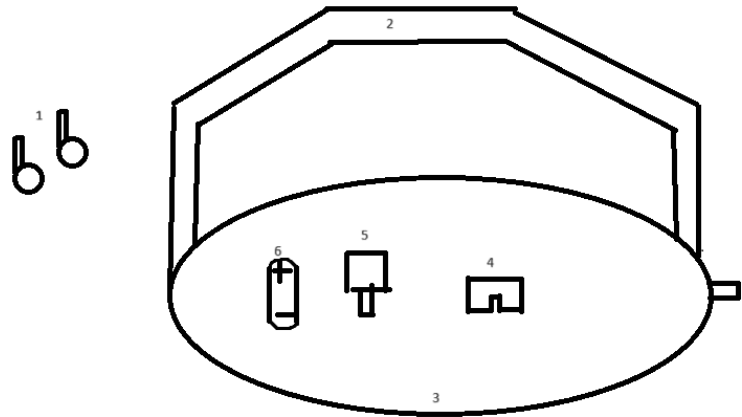
A device that does not use sound to wake a user up could include using other sense such as a touch like a device that vibrates to wake the user up. This solution works great; it is a smart solution to the early bird problem. The device would have to be battery powered and would be close enough for them to feel.

Like the second solution to wake a person up but using another sense like feeling warmth. A device like this would slowly heat up until the user gets up. This solution would be more comfortable for the user but poses some problems. The biggest problem with this is that it is less safe, since it uses a lot of energy to warm up, it runs the risk of exploding or catching fire. Furthermore, if the user wants to sleep in then the device will create a hot environment that will prevent them from doing so.

Another solution to this problem would be a device that blocks light or sound. It would be a wearable device like a sleeping mask which blocks out all light or earbuds that block all sound. This solution would be great for solving the night owl, any noise or light that is they create would be blocked.

The last solution would be a combination of both the vibration device and the sleeping mask/ earbuds. It is the perfect solution for both problems. Some challenges with it would have to be electronic, store batteries. The user interface would be problematic it could either connect to a phone though Bluetooth or have a touch screen interface to set/ turn off the alarm.

Prototype:

The prototype is a smart sleep mask which has the capability to vibrate to wake the user up and has Bluetooth capabilities to set and turn off the alarm. In addition, the mask blocks out all light and the earbuds block out all sound. The components of the product include earbuds 1, strap for fitting around the head 2, cloth to block out all light 3, Bluetooth interface card 4, vibrator device 5, battery 6 and lastly a charger 7. The design would need to be compact, safe and comfortable to be wearable.

Test:

Feedback

Sleeping on the stomach or side is not possible due to how the electronic components press on the head. Leaving earbuds prolonged in the ear might damage it. The earbuds might not block all sound but only some of it. Recharging the device every x amount of time becomes annoying.

Improvements

The hardware may have to be surrounded by cushions. A possible dedicated on/off button needed to quickly turn it off without fidgeting with the smartphone connecting to Bluetooth. Possibly remove the earbuds, to focus on the main device. Add heating functionality to have more customization. Have some instruction for operating the device. Lastly, making the device more compact and efficient.