

BACKGROUND

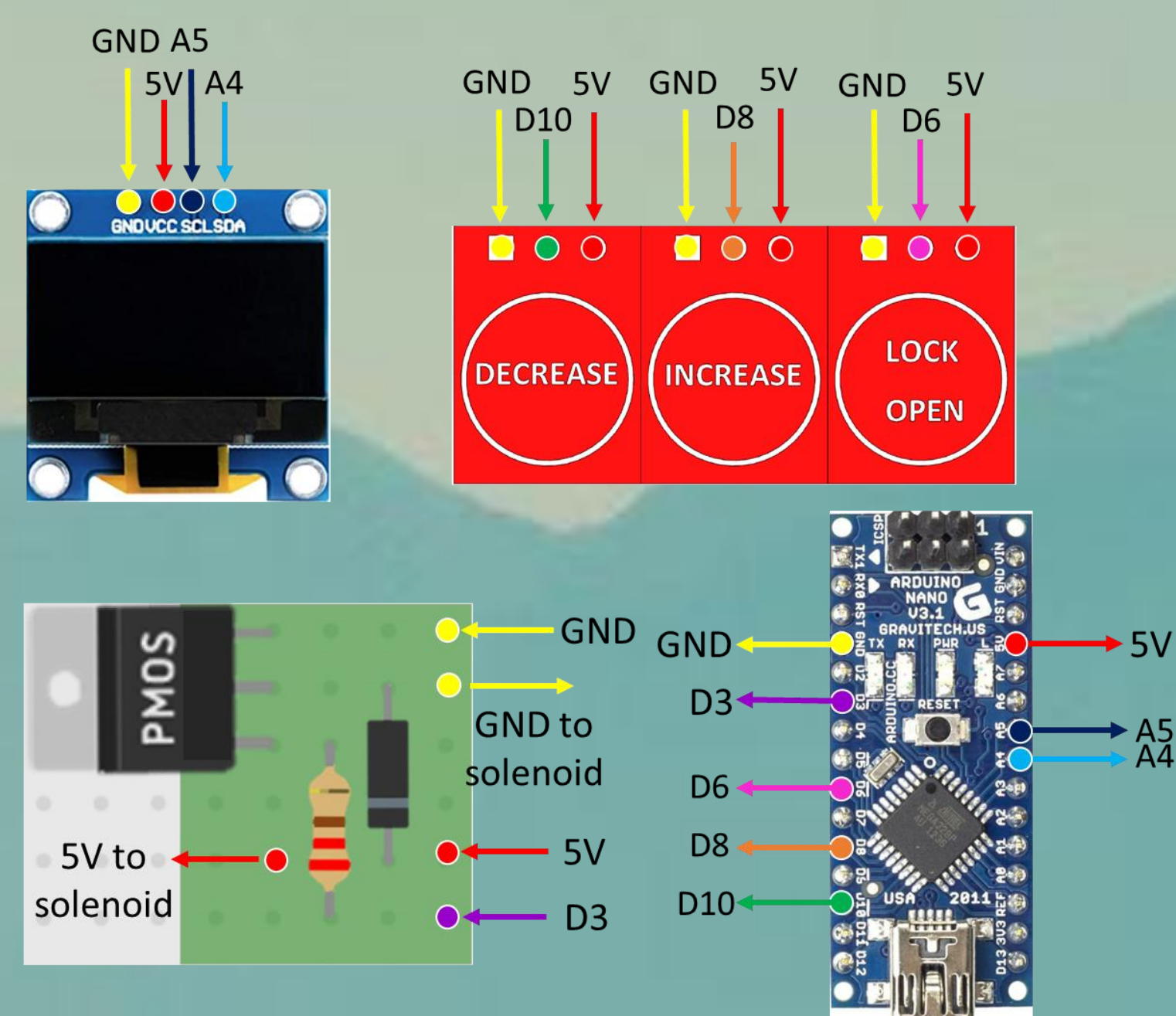
Excessive smartphone use can cause cognitive & emotional issues including depression, anxiety, trouble sleeping, optical problems, and impaired attention/memory.¹ Existing methods for blocking screen use are imperfect: software and hardware solutions can be bypassed (competitor products open simply by holding a button for 10+ seconds).

OBJECTIVE

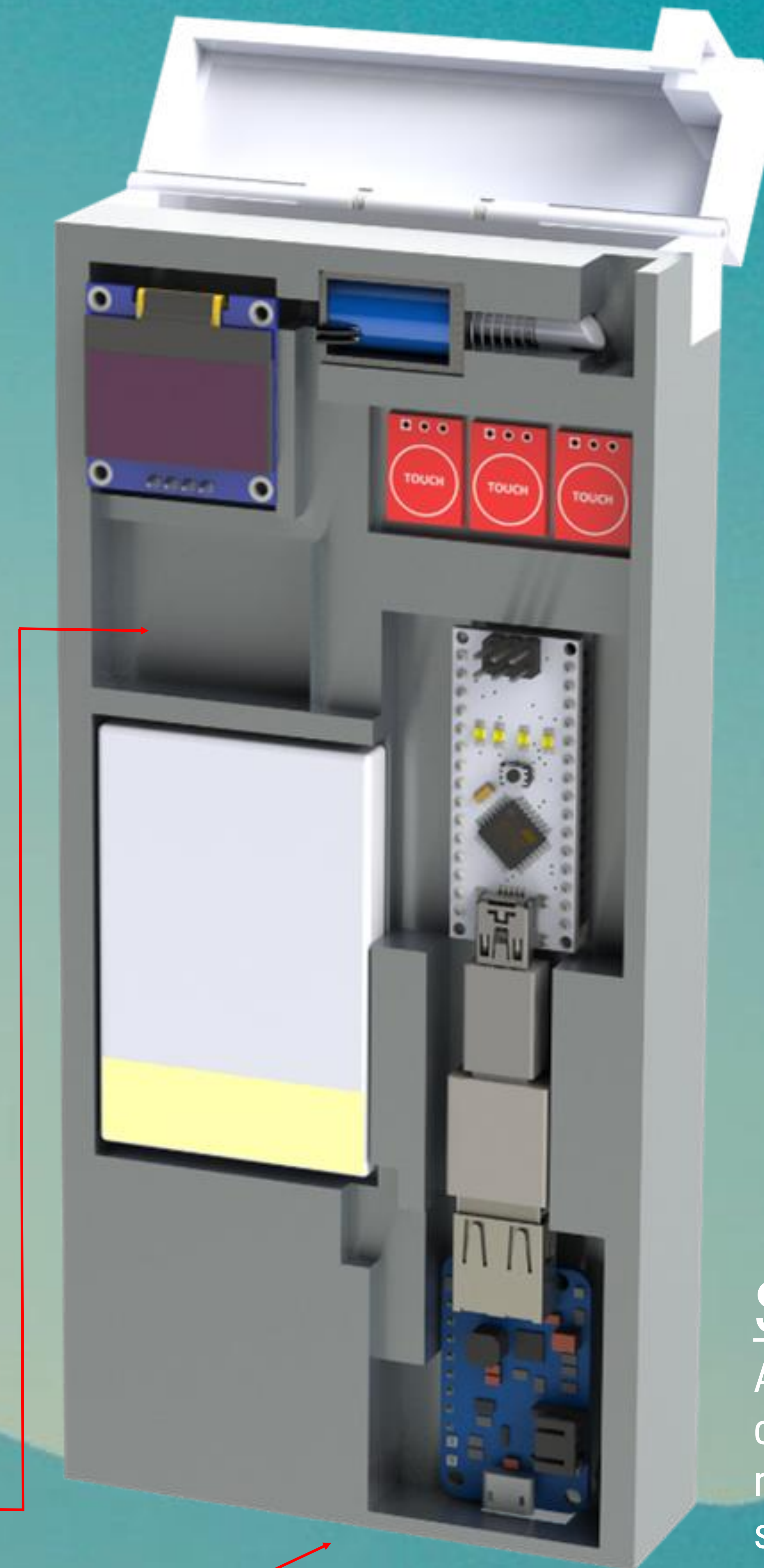
To develop a portable phone case which can be locked for a set time with no built-in bypass method; this can be used by adults in daily life, parents with children, or teachers with students.

ELECTRICAL

The circuit is powered by a 3.7V 2100 mAh LiPo battery. An Adafruit PowerBoost 1000C converts this to 5.2V 1A, which flows to an Arduino Nano. The Nano powers the LCD, solenoid and touch sensors via a shared 5V pin. Digital pins communicate with the solenoid & touch sensors; analog pins communicate with the I2C LCD screen.



Charge ports for the user's phone and 3.7V battery are here, fitted with dust covers.



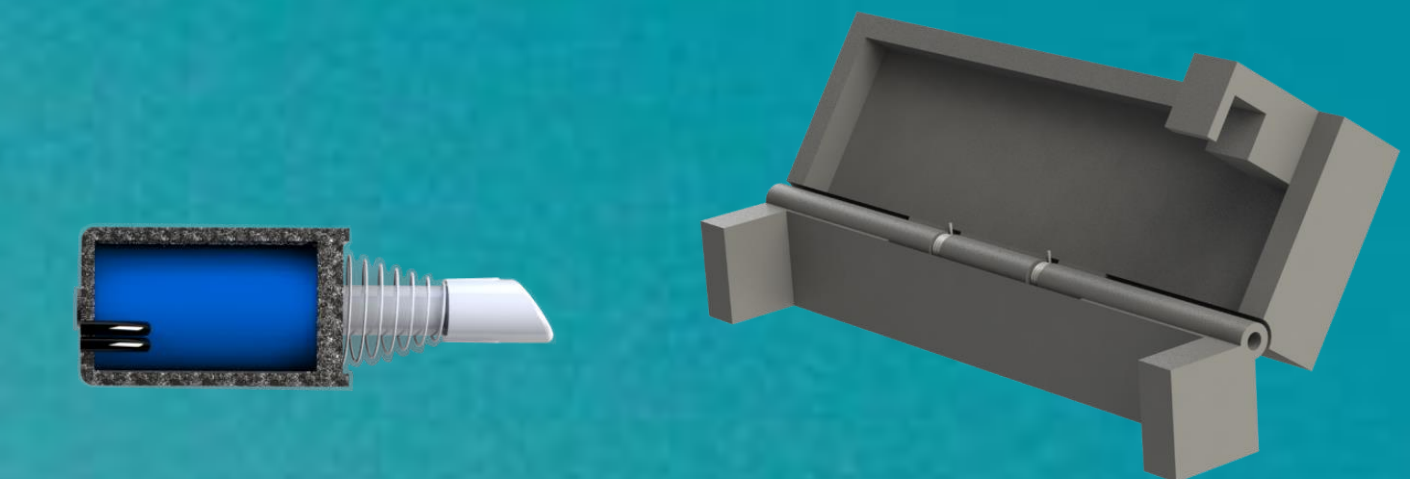
DIRECTIONS FOR USE

1. Insert phone & close lid
2. Set time (up to 99 hours, 99 minutes)
3. Hold right button to lock
4. Once time expires, press right button to open lid



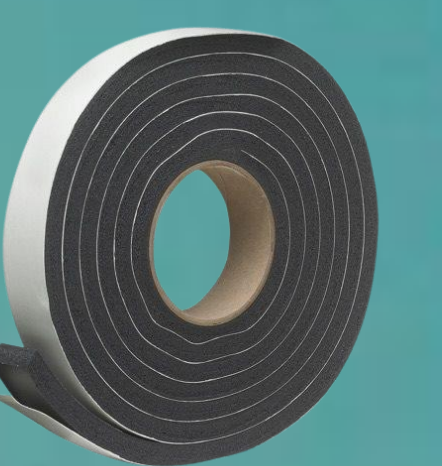
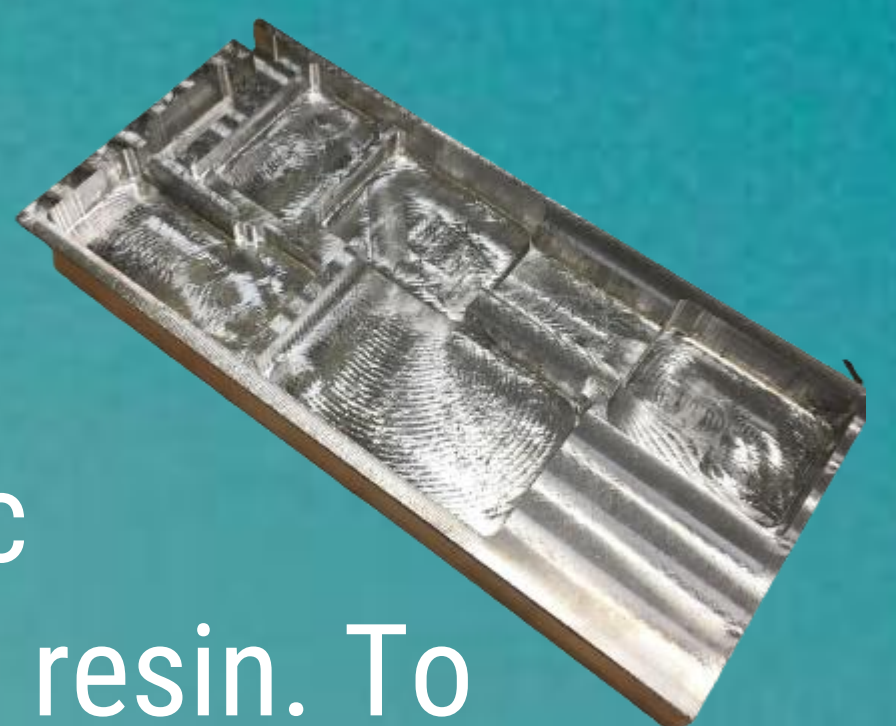
MECHANICAL

A push-pull solenoid with a custom angled tip locks the lid automatically upon closing. A spring-loaded hinge automatically opens the lid when the solenoid retracts.



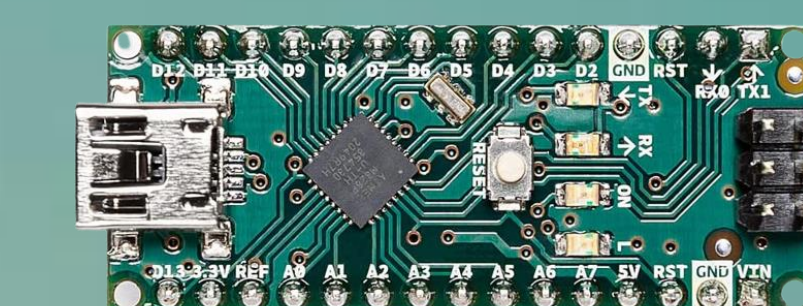
MATERIAL

The body is aluminum, machined on a CNC and lined with an insulator to eliminate risk of electric shock. The lid and hinge are precision 3D-printed resin. To protect the user's phone, the inside of the case is lined with marine-grade rubber foam. The touch sensors and LCD are behind waterproofed tempered glass, and the electrical components are covered by a faceplate.



SOFTWARE

All code was written in Arduino IDE, using libraries to simplify coding of the buttons and LCD. When the user holds the rightmost button, a countdown loop begins and all other software functionality is locked.



Lock Your Phone, Free Your Mind