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.

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.

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.

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Lock Your Phone, Free Your Mind