

CSE453 Automated Locker Engineering Notebook

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//Meeting notes have been moved down under 3/3

Questions to ask client:

- Ask for contact information/best availability
- Can the student open an unlocked locker?
- Can the student use a touchpad?
- What are some of the things Jacob is comfortable doing?
- What is something you'd like to see in the locker?
- Can we drill holes in the locker? → Yes

Questions to ask Jacob:

- Are you comfortable using a touchpad or a keypad? (if so what would be a good pin?)
- Do you think it would be cool to scan a keychain or a card to open the locker?
- What would make it easier for you to open the locker?
- Would you feel comfortable using a button to turn on the locker?
- What is your favorite color?
- Are unable to see certain colors or shades of colors?

Try to use cables instead of wires - so it's safer (have cable sleeves over the wires)

Get standard locker design from other team and adjust design for disability needs

Consider RFID over touchpad - RFID fob can go on keychain

Need to have a manual override for admins/backup

Student: Jacob

Mother: Stacy Dutka

2/19/21

Anthony - Someone mentioned in the requirements doc about resetting the pin for the keypad if used, I was thinking having a pin reset button on the inside of the locker would be good for this. That way if the student forgets the pin/there is a new

student, the teacher can use the manual override to unlock it then have the pin reset.

2/22

- No status on communication with Jacob
- Hopefully meeting on 23rd or 24th
- Other locker team will link and share info
- 2 pence lockers in lab, different from Alden lockers
- Rent locker from Capen
- Baldy 200c Lab

2/24

- Met with the other Locker team
- The lockers in the lab are the Depew ones, Alden ones are very similar
- Face plate should be the same as the one for Alden
- The lockers in Alden operate differently than the ones in Depew - Depew uses a latch on lock, Alden uses a lift up one (when you unlock, you push the button up and open the locker)
- Look at the locker for Depew and make modifications to fit the specifications of lockers in Alden
- GitHub repos:
 - <https://github.com/DonBrant/CSE-453-ALB/tree/develop>
 - <https://github.com/shellshocker98/CSE453-Locker-Project>
- The code works for the most part, just need to make slight modifications.
- Designs for lock
 - servo to lift up rod
 - Lock solenoid to latch when door is shut

3/3 Meeting With Jacob

Questions for Ms. Dutka and Jacob:

1. Ask for contact information/best availability
2. What are some of the things you are comfortable doing?
3. Are you comfortable using a touchpad or a keypad? (if so, what would be a good pin?)
4. Do you think it would be cool to scan a keychain or a card to open the locker?
5. What would make it easier for you to open the locker?
6. Would you feel comfortable using a button to turn on the locker?
7. Are you unable to see certain colors or shades of colors?
8. What is something you would like to see in the locker?
9. What is your favorite color?

Answers:

1. Best mode of communication - Email or text Jacob's mom, Stacey Dutka and then she will forward it on to Jacob
 - a. E:mail: spjd1616@yahoo.com
2. Favorite colors: red & black

Notes:

- Has fine motor issues so can't use a combination lock
- Previously had a key lock which worked for him
- Locker needs to be accessible in the event of an emergency/manual override
- Grabbing the locker and opening it is hard
- Can't reach the top shelf. Probably put the arduino + battery there - he could get taller :)
- Get the door to open using magnets → likes that idea
- Make sure door couldn't swing and hit him
- Favorite colors: Red + Black
- Wrestling fan - Finn Bálor
- Prefers a button, push & go. Close to an Xbox power/controller button
- If RFID, do a bracelet → need to have the key on him at all times
- Probably put it on his computer bag. Doing both computer bag and bracelet is preferred
- Flip a switch vs push a button → prefers to push the button. Give multiple options for buttons and use the one he prefers.
- Not color blind
- Prefers the RFID one
- PIN: 1616
- Plays the drums and is into drama and video games
- Likes the idea of the door opening on its own

3/20 Meeting with Kris who was visiting at Alden

More measurements were taken of the actual lockers

Came up with new ideas to have the latch be lifted up:

1. Use a high torque servo motor to pull up the latch
2. Place a solenoid at the bottom of the main latch rather than the bottom of the locker. (allows for larger solenoids with higher force).

3/31

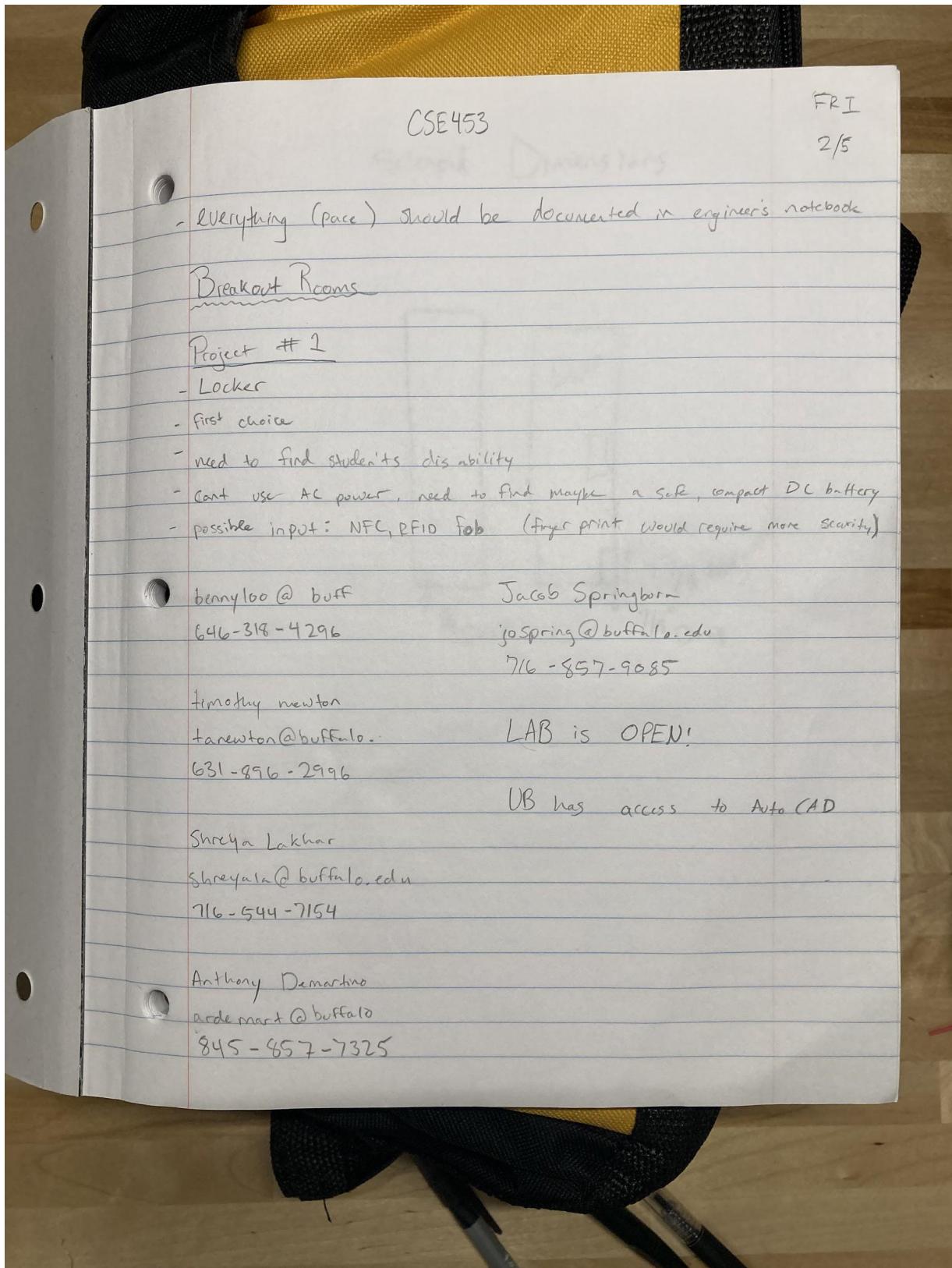
Arduino, breadboard, and test kit arrived. Dewalt batteries will arrive later today.

Next steps should be converting one of the dewalt chargers to be a battery dock for the locker. Lab time reserved for Fri 4/2. -Anthony

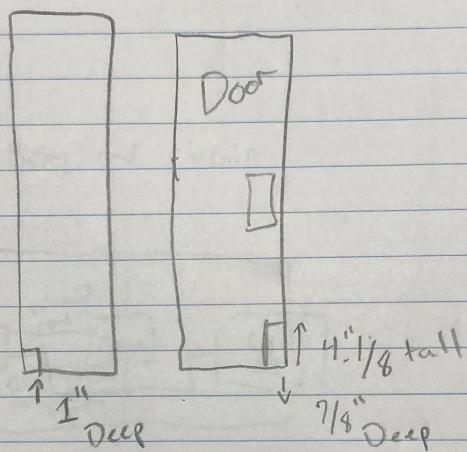
4/2

Opened Battery charging pack, removed battery connecting clip from the rest of circuit. Tried to plan out power distribution and more parts that are needed.

In Lab Engineering Notebook



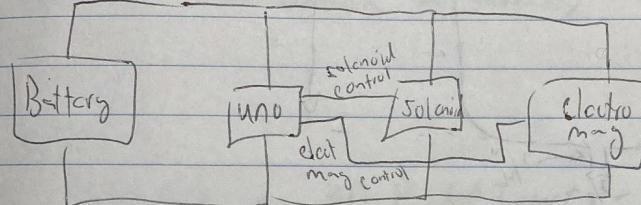
Solenoid Dimensions



April 2

- Configuring Battery

Basic Layout of Battery and circuit



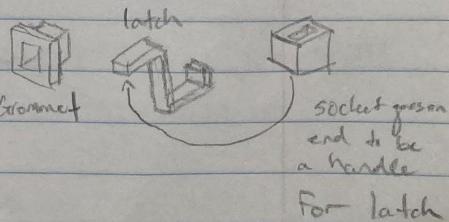
Zener Diode

- DC Plug with soldered cables

April 9

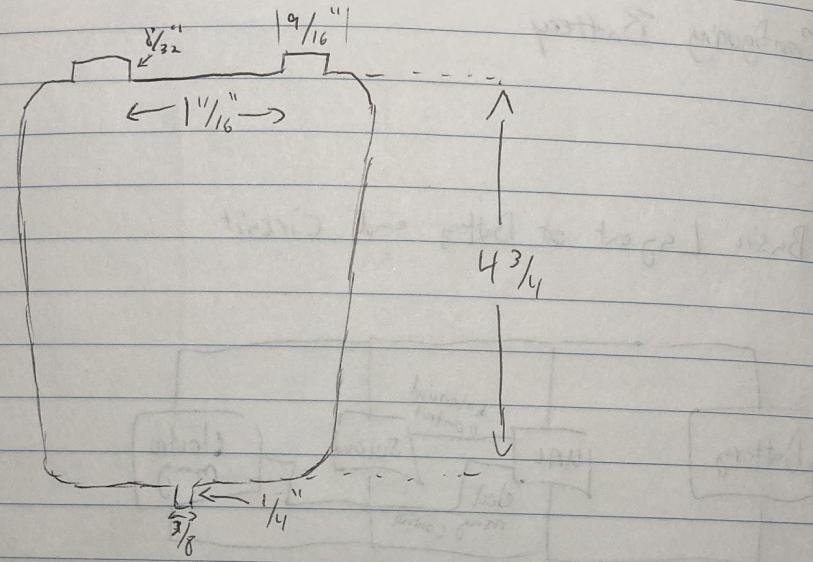
- Malik in lab
- Printing 3 parts
- Grommet for mechanical lock
- latch & socket

Printed at 33.9, 76%



4/10

Push-Button width for CAD = $1\frac{1}{16}$ "



widest pt = $3\frac{10}{16}$ "

thinnest = $2\frac{10}{16}$ "

thickness of locker $\approx \frac{1}{16}$ "

Arduino Code

- RFID Tags ~~tags~~ and Read/Write implemented
- wrote a program to write "12345678" to tag
- ~~Program~~ Program only saves "123456" for some reason
Look at PrintHex and SaveHex
Broadband has 2 LEDs that test ~~for~~ authentication

To Do: Push Button & solenoid & relays

4/11

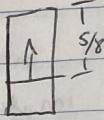
update on 3D Printed Insert - Anthony

1. make clips separate from cover b/c ~~support~~ removal
of supports is too bothersome and damages insert.

2. make hole for bottom screw be centered at $\frac{1}{16}$ "
below current inner bottom.

3. make inner bottom $\frac{1}{4}$ " lower.

4/17



tumbler lock 90°

length of bar = $1\frac{1}{4}$ "

width of bar = $\frac{5}{8}$ "

tumbler lock down $1\frac{1}{2}$ " from top
left $1\frac{3}{8}$ " from right

tumbler lock width $\frac{5}{8}$ " diameter or .31"

raised outer face of insert = $\frac{1}{4}$ " from locker door.

push button diameter = 1.08 "

Tim: Connected Adafruit K100 button switch
(with 12V regulated from 20) in series
with Ard UNO.

Soldered wires parallel to button-
waiting for ~~but~~ arcade button insert

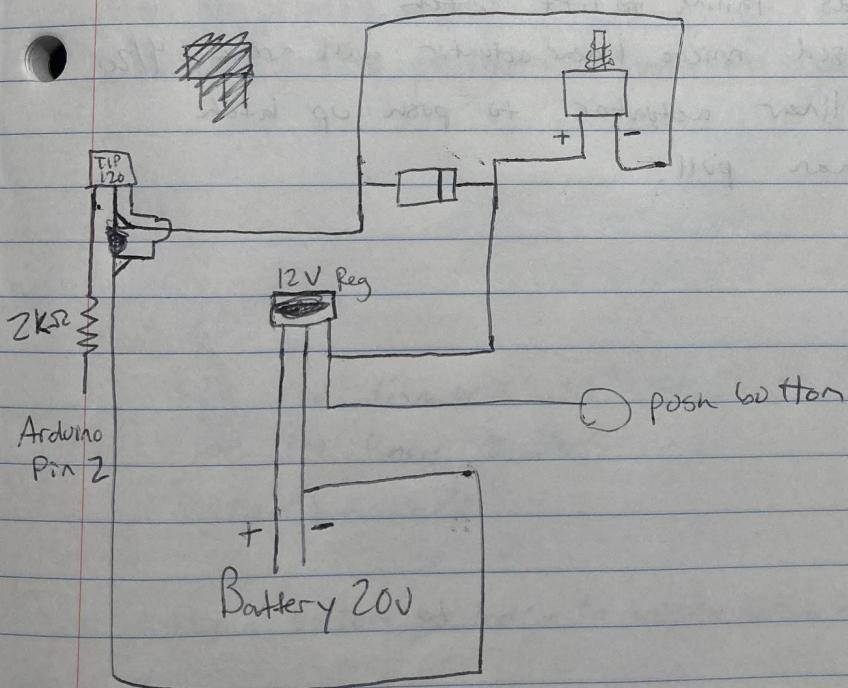
Mark ~~1/12~~ programmed → Soldered to ~~Arduino~~ write high & low
to arduino ←

- Need to write keys to all tags
- test design on locker

4/17

- To do: build platform on locker for solenoid to sit
- hole in locker latch already so just slide solenoid in, put pin to lock solenoid
- Fix ~~arduino~~ arduino shutting off issue.
- are we going to use electromagnet or springs?

TIP 120 & Transistor & solenoid & arduino connections



4/19 Anthony

④ Got finished 3D print,
checked that hole sizes fit
batter and lock, all good✓
fits into locker door

Just waiting for glue to set
for hook part of the insert

Malik: Connected components to green locker

- solenoids failing to lift latch
- purchased micro linear actuator will arrive 4/20
- test linear actuator to push up latch
rather than pull:

3D Print Insert

L to Gap: 1 inch

RFID Gap: 1 inch $\frac{5}{16}$ in

Bottom to Gap: 1 inch $\frac{3}{16}$ in

4/23 Actuator: currently unidirectional, requires polarity reverse for direct

Electromagnet: works directly to power source, needs another magnet to repel. Magnetic tape against a 3D printed block

Connect to transistor

Solenoids are no good

New 3D printed insert.

- Centered button placement between rfid reader

4/24

Actuator

hole rod diameter = .12"

hole thickness = .10"

rect width = .78"

From bottom of lock to actuator bottom = .35"

Update on electromagnet - even with permanent magnet, it won't repel.

4/26 3D print updates

width of t mount and reflector
reduce by $3/16$ " or $1/4$ "

Add brick plate to reflector

lower cylinder by $1/8$ "

Math

- Rewired circuit
- cleaned up mess
- fixed power issue (hopefully)
doesn't unexpectedly turn off anymore
- seems like it was a cooling / circuit issue
- relays being written high at same time?
still needs more testing to ensure proper signals! before final implementation

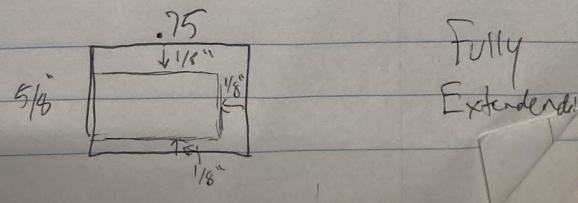
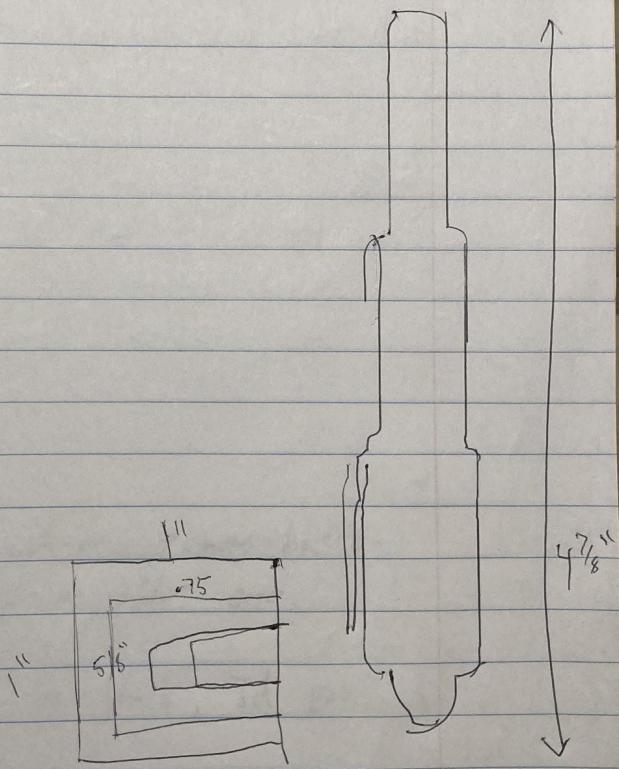
- organized code
 - wrote password to all tags except 2 cards
 - made three files: locker
 - read rfid
 - write rfid

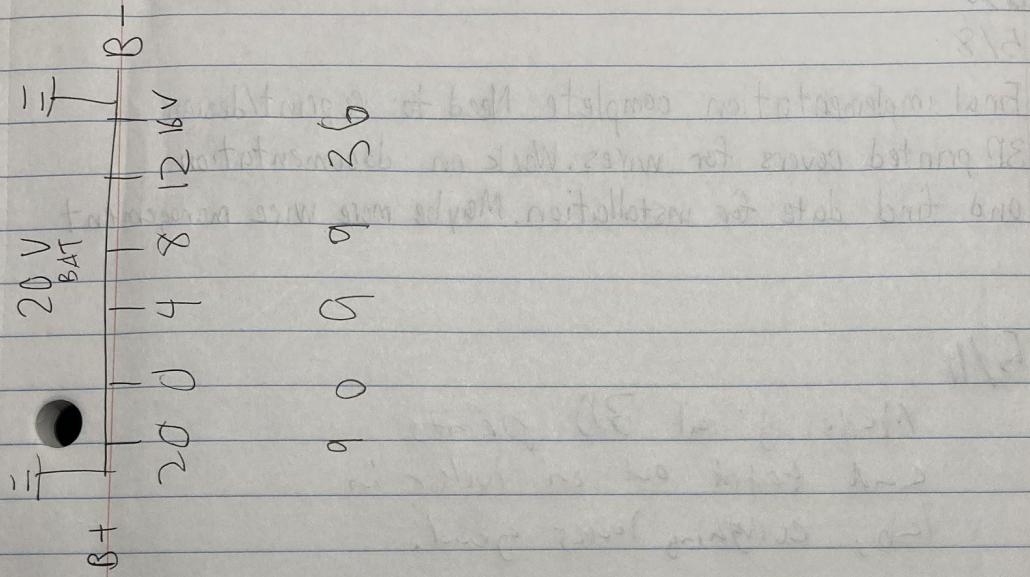
- TODD
- Tony sent in new activator bracket, printed
 - need to be able to READ foreign RFID Tags
 - install 3D locker piece and figure out rest of fittings
 - figure out magnet / spring thing
 - measure wires to be soldered

4/28

Mark

- Tested parts in locker
- RFID doesn't work with long wires
- need to attach arduino to locker
- designed and printed locker parts





80 5/6

ran into problem where power button
got fried. Going to use older one

Everything else is on track, 3d prints are being finalized

5/9 Final design, tested almost final implementation, just need to get it working.

5/10

5/8

Final implementation complete. Need to reprint/design 3D printed covers for wires. Work on documentation and find date for installation. Maybe more wire management

5/11

Made final 3D prints
and tested out on locker in
lab, everything looks good.

5/13

Searched the circuit parts to fit
inside of the housing
and cleaned up workspace.