How to Assemble the Smart Pill Box

Introduction:
The Smart Pill Box (SPB) is a semester long project dedicated to providing an efficient and safe way to manage medication for elderly patients, especially those with cognitive decline, memory loss, and visual impairments. These instructions will show you how to assemble and replace your features inside the Smart Pill Box. The steps that follow are intended for people with basic soldering skills, 3D Modeling experience, and electronics skills as inexperience can result in a ruined Smart Pill Box. Assembling the SPB usually takes 30-60 minutes. Following the instructions correctly can save time as it focuses on disassembly, repair, reassembling, and troubleshooting.

Parts and Tools:
The Smart Pill Box can easily be assembled with the basic parts and the basic tools needed for the assembly. Spare parts are provided and can be reprinted with the provided Gcode files. If reprinted parts are required, follow the same guide for reassembly.

- 3D Printer
- SPB Parts
- Prying Tools
- Screwdrivers
- Soldering kit (solder, soldering tool, desoldering tools, flux)

Precautionary information
Throughout these instructions, precautionary information will be displayed. These are important as they will protect your health and the usability of your controller. The precautionary information will appear as:

Precautionary Sign	Meaning
Note:	A note provides information that can be helpful
NOTICE:	A notice precaution indicated that there is a risk of damaging the controller.
CAUTION:	A caution statement indicates an action can result in minor injury to the user or damage to a component within the controller.
WARNING:	A warning statement indicates an action can result in serious injury to the user.

Disassembling the Smart Pill Box

To start, you first must disassemble the SPB to get to the electronics where our motor controllers are connected. This section will teach you how to safely disassemble the SPB without causing any more damage.

Figure 1 (Removing screws from Baseplate)

Figure 2 (Removing screws from Top & Drop Plate)

NOTICE: Failure to unplug the SPB can result in damage to the Raspberry Pi completely ruining the device.

1. Unplug the Smart Pill Box.
2. Remove the tray and rotating capsule.
3. Turn the Smart Pill Box over where the baseplate is facing upward.
4. Remove the screws from the bottom (baseplate) of the device.

   Note: Figure 1 displays in white where the screws should be removed from. It is good practice to place screws in a safe place to avoid losing them.
5. Carefully turn the SPB over back to the original position
6. Unscrew the five screws on the top of the Smart Pill Box that hold the drop plate in place.

   Note: Figure 2 displays in red which screws need to be removed.
7. Carefully separate the top of the device from the baseplate.

   Note: The board will seem stuck. Push the top walls back then pull up to avoid a screw location.
8. Place the top portion of the device to the left of the baseplate.
9. Make appropriate troubleshooting fixes if needed.

This portion was dedicated to quick access to the inside electronics of the Smart Pill Box. If further disassembly is required continue with this guide.

Removing the Touchscreen Housing

Now that we have removed all other components, we can focus on completely disassembling the Smart Pill Box. This section will teach you which components to remove and how to protect our device in the process.

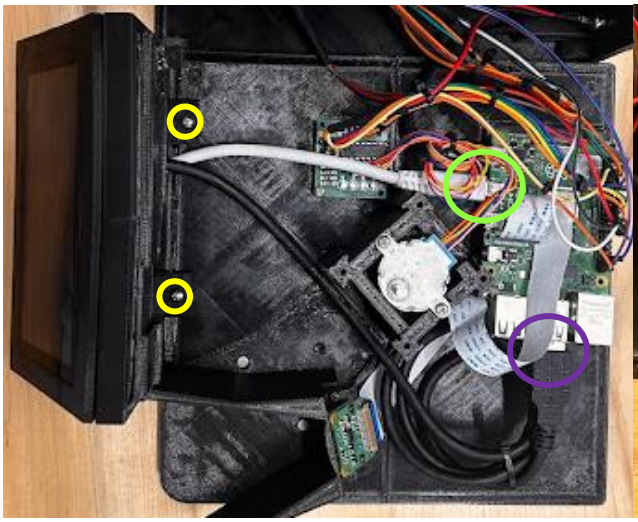

Figure 3 (Removing Screws for Touchscreen)

Figure 4 (Connections to desolder)

NOTICE: Unplugging the USB and HDMI connections from the touchscreen is very difficult and can cause damage to the ports. Be very careful to avoid twisting or turning these cords. Avoid damage by disconnecting from the Raspberry Pi first.

1. Unplug the micro-HDMI cord.

   Note: Figure 3 shows the location (in green) where the cord should be unplugged.

2. Remove the USB connection.

   Note: Figure 3 shows the location (in purple) where the cord should be unplugged.

3. Unscrew the two screws holding the touchscreen housing to the baseplate.

   Note: Figure 3 displays the location of the screws for removal in yellow.

4. Carefully separate the touchscreen housing from the baseplate.
5. Set baseplate aside for future disassembly.
6. Use a pry tool to remove the faceplate from the touchscreen.
7. Remove the two screws holding the touchscreen into place.

   Note: Figure 4 displays the location of the screws for removal in red.

8. Carefully pull out the touchscreen from the housing.
9. Unplug the USB and Micro USB if needed.

Unplugging the Raspberry Pi Connections

Now we can look at the removal of components from the Baseplate. This section will teach you how to disconnect the cables from the servo motor, push buttons, stepper motor, and camera.

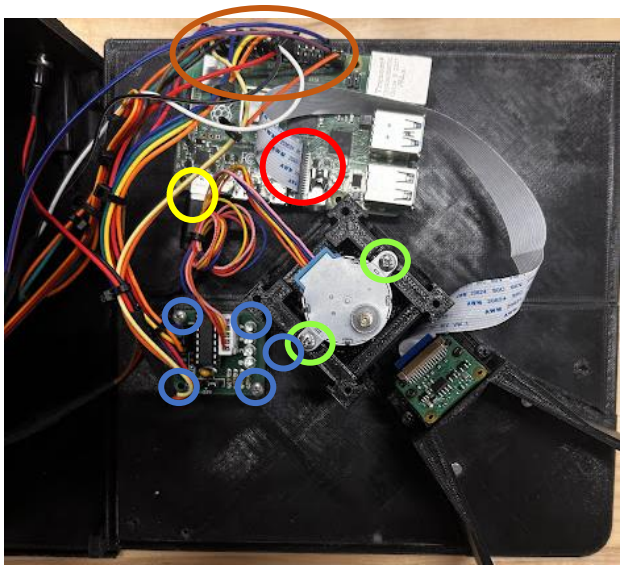

Figure 5 (Flush Finished Connection)

1. Unplug the USB-C extension cable.

   Note: Figure 5 displays the location of the USB-C in yellow

2. Remove the camera cable by carefully lifting the gray tab.

   Note: Figure 5 shows the location in red

3. Identify all contacts properly line up with the circuit board.
4. Unscrew the screws of the Stepper Motor

   Note: Figure 5 shows the screws for removal in green

5. Remove the screws that hold the motor driver in place.

   Note: Shown in blue in Figure 5

6. Unplug the motor driver from the Raspberry Pi.
7. Remove the other remaining connections from the Raspberry Pi.

   Note: Shown in Figure 5 in orange. Appendix A displays the corresponding pinouts of each component.

8. Unscrew the Raspberry Pi from the baseplate.

The Raspberry Pi should now be completely cleaned of any wires and removed from the baseplate. The disassembly of the top portion will now be shown, specifically the lid and walls.

Disassembling the Servo and Lid

Disassembly for the lid is rather simple. This section will teach you how to do that and make sure everything in the SPB is properly disassembled.

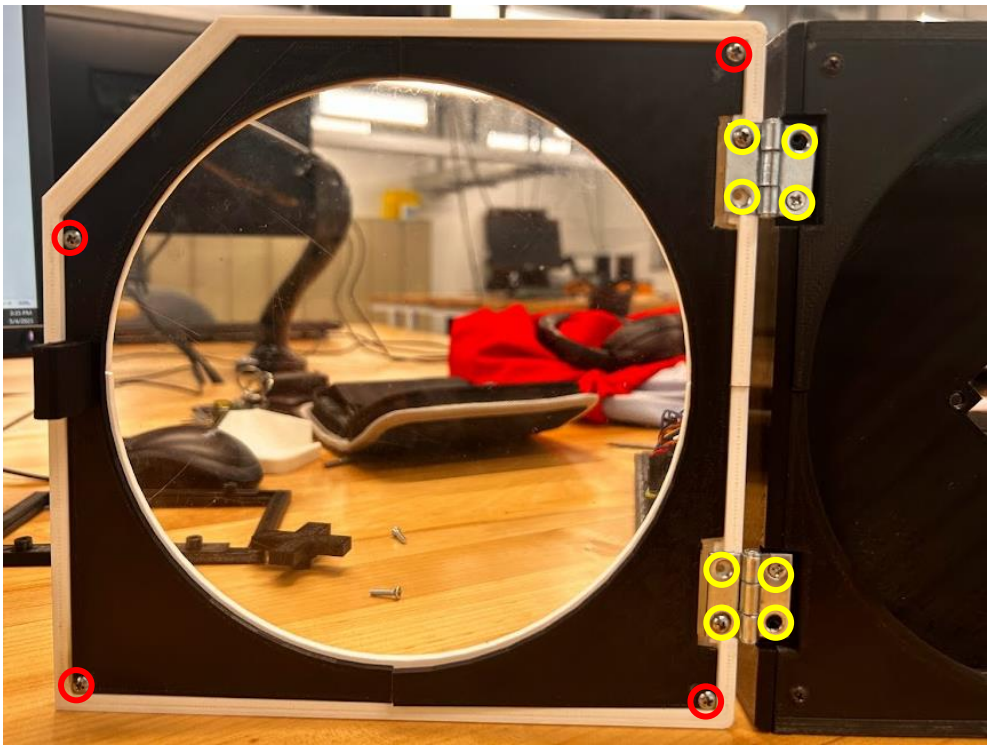

Figure 8 (Taking the lid apart)

1. Lift the lid until it is open.
2. Remove the screws from the hinges.
   Note: Figure 8 shows where the screw needs to be removed in red
3. Unscrew the 4 other screws.
   Note: Figure 8 shows where the screw needs to be removed in yellow
4. Pull lid apart as needed.

The lid should now be completely separated. For further disassembly continue.

Disassembling the Servo and Lid

Now the baseplate has been completely disassembled we can focus on disassembling the top component. This section will teach you how to do that and make sure everything in the SPB is properly disassembled.

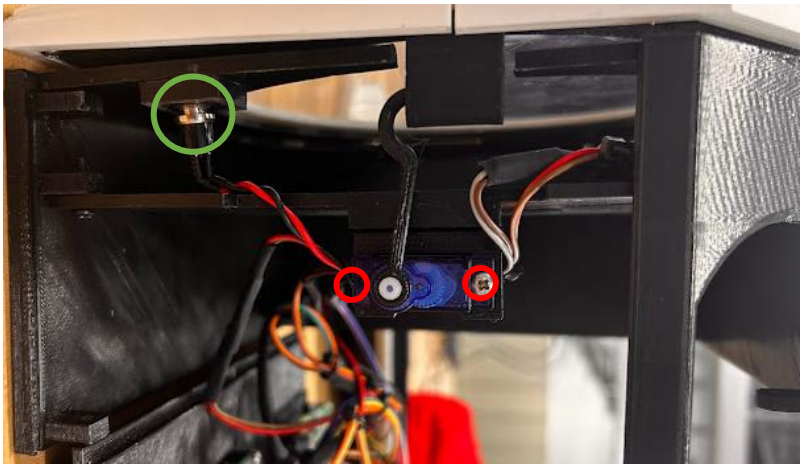

Figure 6 (Servo and Button Removal)

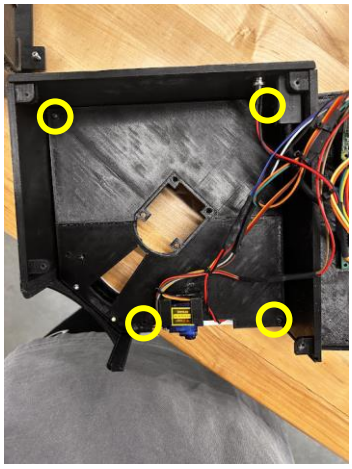

Figure 7 (Connections for walls)

1. Remove the hook from the servo motor.
2. Unscrew the servo motor.
   Note: Figure 6 shows where the screw needs to be removed in red
3. Remove the servo from the holder.
4. Unscrew the holder from the drop plate and set aside.
5. Remove the Push Button.
   Note: Figure 6 shows the location in green.
6. Remove the LEDs from their location.
7. Place the box where the drop plate is facing down. (Figure 7)
8. Unscrew the screws connecting the drop plate to the walls.
   Note: Figure 7 shows the location in yellow. Note the USB-C converter blocks the location of one screw. A longer screwdriver is recommended.
9. Turn box back over.
10. Remove remaining screws keeping the top plate connected to the walls.

The box should be disassembled now, and the plates should be separated from the walls. To create fixes for any component, follow the disassembly guide for help. Disassemble anymore components as needed for the final

Conclusion

Congratulations! You have completely disassembled the Smart Pill Box. For any more information not given look at the provided GitHub or photos provided. Good job.

Appendix A: Electrical Components Overview

1.) Stepper Motor
2.) Motor Driver
3.) Servo Motor
4.) Raspberry Pi
5.) Camera Module
6.) Touchscreen Housing
7.) Pushbutton (Power Off)
8.) Pushbutton (Locking Control)
9.) Micro HDMI to HDMI
10.) USB to Micro-USB

Appendix B: Raspberry Pi Pinout