Software Installation

To run (Windows XP or 7)

1. Pull entire capsorter project from git
2. Navigate to libusb/libusb-win32-bin-1.2.6.0/bin
3. Plug capsorter USB into computer (make sure its not the camera USB connection)
4. Turn on power supply to mcu
5. Run inf-wizard
6. Select the USB device called Capsorter
7. Choose a place to save the driver
8. Install the driver. There will be a message saying the driver has no signature, install anyway

To run (Windows 8 or 10)

Windows 8 and 10 really doesn’t like to install unsigned drivers, you will need to restart your computer in a specific mode to enable installation of the USB driver.

1. Pull entire capsorter project from git
2. Hold shift key while clicking Restart
3. Navigate to Troubleshoot->Advanced Options->Startup Settings->Restart
4. After restart select option 7
5. Navigate to libusb/libusb-win32-bin-1.2.6.0/bin
6. Plug capsorter USB into computer (make sure its not the camera USB connection)
7. Turn on power supply to mcu
8. Run inf-wizard
9. Select the USB device called Capsorter
10. Choose a place to save the driver
11. Install the driver. There will be a message saying the driver has no signature, install anyway

To modify:

1. Install OpenCV as per the instructions in “OpenCV Install Instructions.txt”
2. Install other programs as per “Compilation software instructions.txt”
3. Modify Makefile in project folder to reflect the correct path to the OpenCV libraries and headers on line 22

Compilation

Capsorter

In cmd line navigate to project folder, type and run

make

If an error is given, type and run

gcc -I ./libusb/libusb-win32-bin-1.2.6.0/include -L ./libusb/libusb-win32-bin-1.2.6.0/lib/gcc -O capsorter.c -o capsorter.exe -lusb -lgdi32

ml

In cmd navigate to project folder, type and run

make ml

main

In cmd navigate to project folder->mcu. Type and run

make

Loading code to ATMEGA8U2

1. Navigate to project folder->mcu
2. Ensure power supply for capsorter is off
3. Remove breadboard connector closest to computer on LHS of breadboard (goes to 3rd solenoid PCB) without disrupting any wires
4. Connect ISP programmer (small blue PCB) to 10 pin ISP cable coming from breadboard
5. Connect ISP USB cable to computer (ISP programmer should light up red)
6. In cmd type and run

avrdude -p m8u2 -P usb -c usbasp -U flash:w:main.hex

1. Once load has finished it will hopefully display say x bytes of flash verified, if not unplug usb cable from computer and call me
2. Unplug ISP USB from computer
3. Unplug ISP programmer from ISP IDC cable
4. Reinsert 6 pin header from 3rd solenoid PCB

To run the capsorter

1. Ensure that camera and capsorter are both connected via USB to computer
2. Turn on power supply for electronics
3. In cmd, navigate to project folder, type and run “capsorter”
4. GUI will appear, wait for text below image to say “Camera Ready”
5. Turn on conveyor belt (by plugging in)
6. Turn on hopper (can be loaded first)

To shutdown the capsorter

1. Turn off hopper
2. Turn off conveyor belt (unplug motor)
3. Close capsorter.exe by clicking the X button
4. Turn off power supply to capsorter electronics

Troubleshooting:

* When capsorter.exe is run, I get a dialog box saying something “The code execution cannot proceed because <file>.dll was not found. Reinstalling the program may fix this problem”

Call me and tell me the name of the .dll file, I will find one and update the repository.

* My save file disappeared!

I am aware of this issue and am in the process of fixing it, in the meantime ensure that before the program is closed a cap is run through the system and you do not update or create a bin using that information. (Somehow acts as a buffer)

* In the GUI, “Calibrating camera” never changes to “Camera Ready”

This is due to the wrong camera being selected (typically the webcam on your computer instead of the webcam via USB). If you have the ability to modify code, attempt to change the CAMERA\_ID define, and recompile. Typically it is 0 if the computer does not have a built in webcam, or 1 if the computer does have a built in webcam.

* No solenoids move even though the image processing appears to be working!

Have a look at the terminal. If you see messages like “Could not find USB device while transmitting bin x”, check that the capsorter is connected via USB to the computer, and if so, restart the system. This tends to occur when a solenoid causes a large voltage drop, which affects the 5v regulator.

* The images are really dark or don’t look like the inside of the box!

Check the LED strip inside the camera box, it’s just bluetacked to the wall so it may have fallen off

GUI manual

Buttons in order:

Undo: undo the last action, up to 10 actions. This will undo changes to bins, addition of bins or deletion of bins.

Add/remove: after selecting, click on an existing bin to delete it or click on the + icon to add a new bin with the current colour

Skip: Not implemented yet, will skip the current cap

Close: saves data and closes program

When a cap moves through the system, and is identified by the program, you have the opportunity if you want to either create a new bin for that colour, or modify an existing bin. You would want to modify an existing bin if it doesn’t correctly guess a colour. Modifying a bin takes the average RGB value, multiplies it by the number of times it has been modified before (n), adds the current cap RGB value and then divides by n+1. This is implemented by clicking on a bin once a cap has been recognised by the system.