

Team 9



Tactile Image Display

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Progress

- Finalized pin design and mounting ideas
- Designed startup/reset sequence
- Developed test cases
- Improved webapp speed

Performance Test 1

Requirement: Image shall be translated to bit matrix within 5 seconds

Use Case: Submit image to user interface (webapp), generate bit matrix to transmit

Metric: Speed of image conversion to bit matrix (runtime)

Why metric matters: Image has to be correctly translated within a reasonable time frame

Test Sequence:

1. Submit image to webapp
2. Measure runtime taken to translate image
3. Repeat for 9 more images and take average runtime

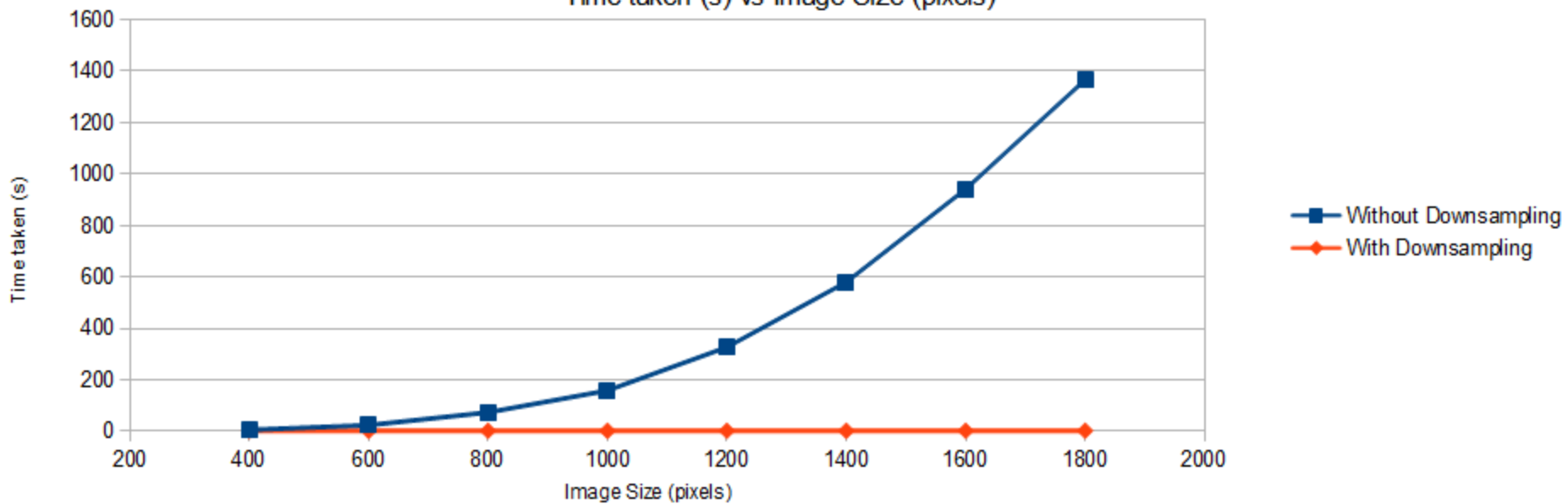
Parameters: Optimization of image processing algorithm, size of image (kept constant)

Configuration/Deployment issues: None as of yet (test should be further expanded once bluetooth communication is working).

Known problems: None as of yet.

Results: Performing downsampling first instead of after the conversion to a binary matrix results in an improvement in overall runtime (<2 sec vs 1600+ sec)

Time taken (s) vs Image Size (pixels)



Reliability Test

Requirement: Device shall be consistent between uses with a deviation of less than 5%

Use Case: User prints out a lot of images before resetting device.

Metric: Amount of deviation of a static pattern after many uses.

Why metric matters: Device should be consistent between multiple uses.

Test Sequence:

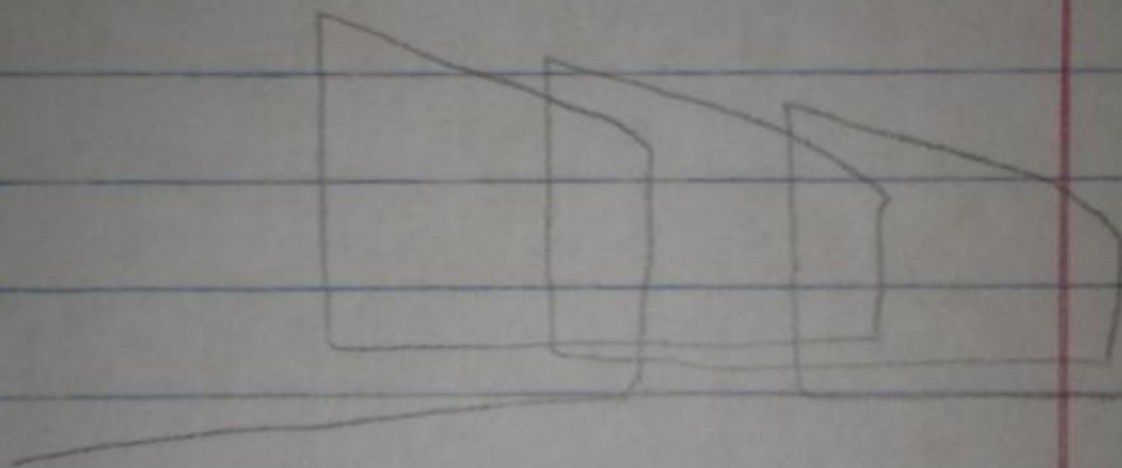
1. Power device up and allow reset to finish.
2. Attach a pencil (instead of actuator for now)
3. Repeat a square pattern for 20 iterations
4. Measure amount of deviation compared to original position

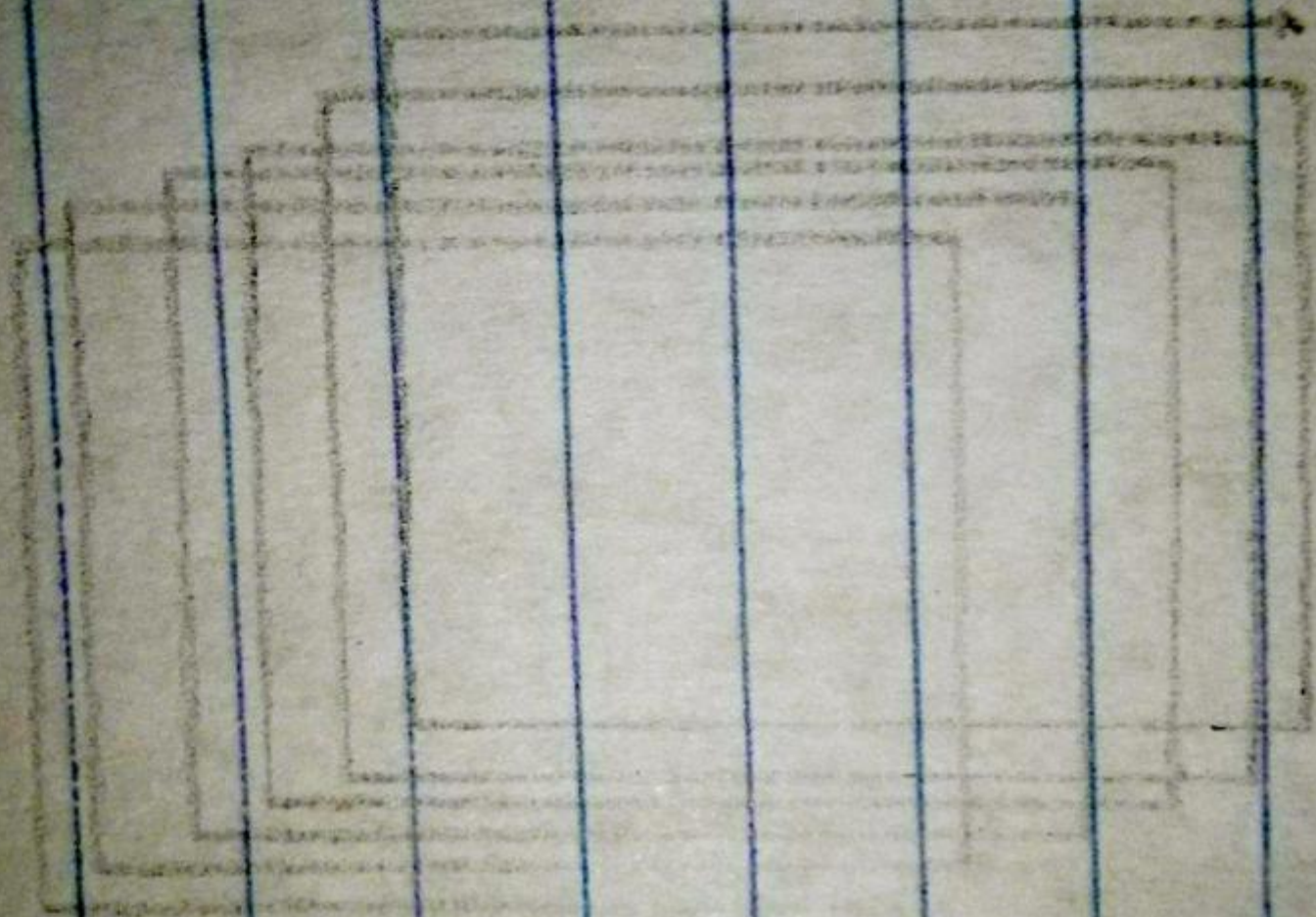
Parameters: Number of iterations

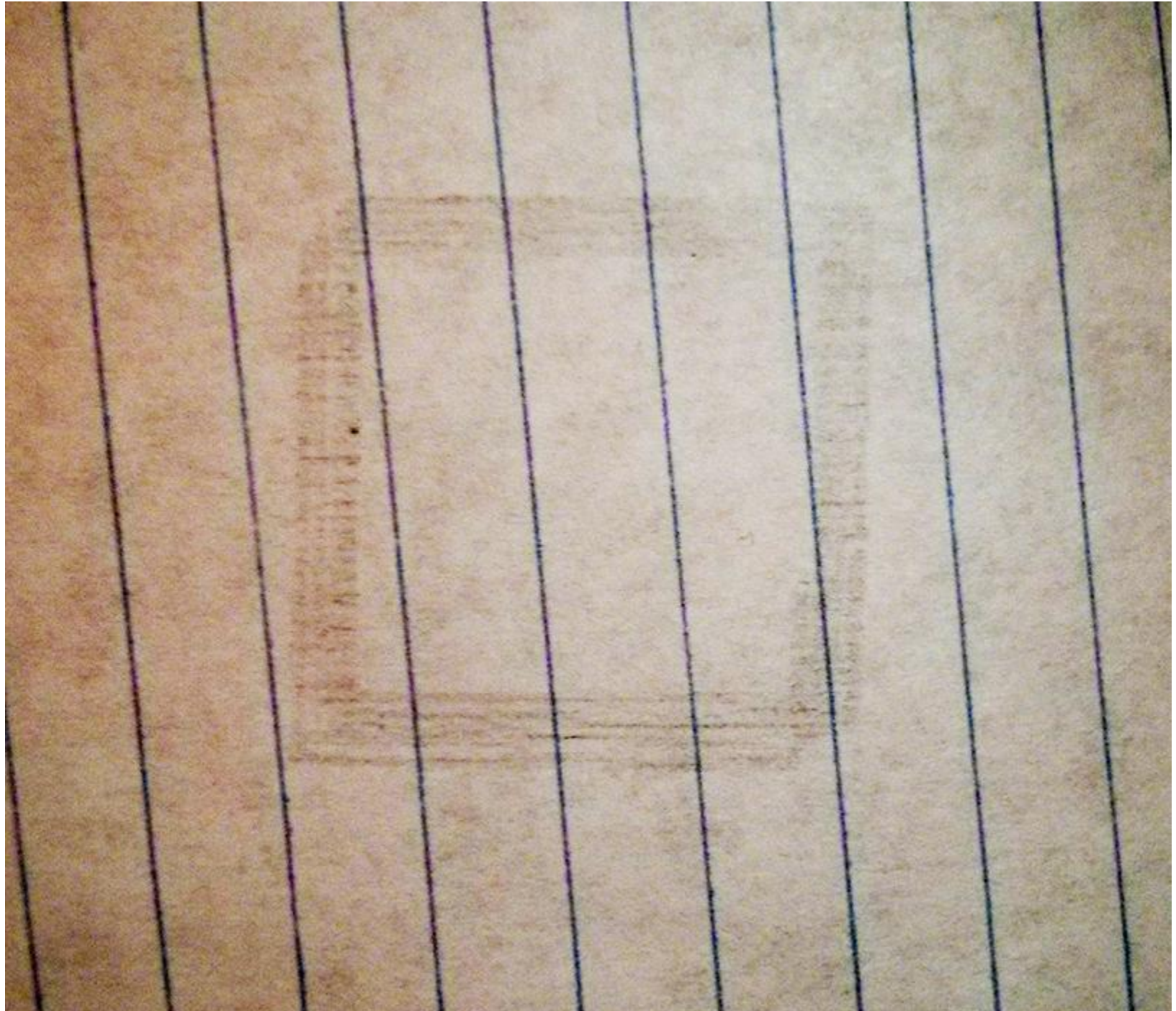
Configuration/Deployment issues: None as of yet.

Known problems: Stability of pencil may affect measurements of deviation - secure pencil as tightly as possible.

Results: Device is reasonably consistent with a maximum recorded deviation of 4.3% (1mm/23mm) as compared to its original position







Power-Up Test

Requirement: Device shall reset to a known location on startup

Use Case: User starting device up.

Metric: Distance between ideal start position of harness heads and actual head position after reset.

Why metric matters: Device has to start from a known position before every image is printed; the distance between ideal start position and actual position thus has to be kept small (not more than the size of a pin head).

Test Sequence:

1. Plug in motor power supply.
2. Plug in Arduino power supply to start device.
3. Wait for harness heads to stop moving.
4. Measure distance between ideal start position and actual harness head position.

Parameters: None (basic pass/fail test like smoke test)

Configuration/Deployment issues: Mechanical setbacks (switch position).

Known problems: Mechanical setbacks (switch position).

Results: None as of now (switch has to be correctly installed first).

Semester Plan

- Get Bluetooth communication working
- Further expand test cases
- Implement graceful startup (needs to be tested) and shutdown
- Install pin array and repeat tests with actuator (where applicable)