

NGW E-Ink Workshop

Never Graduate Week!
May 10, 2021

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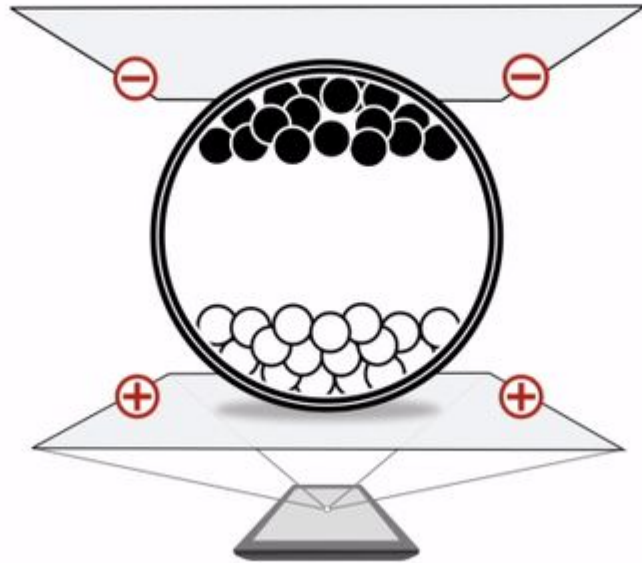
What We're Going to Do!

- Talk about e-ink (and why it's cool)!
- Use the command line
- Work with Python libraries
 - ICS
 - Inky
 - Pillow
- Go through template code - push calendar events to an Inky display
- Customize our displays!

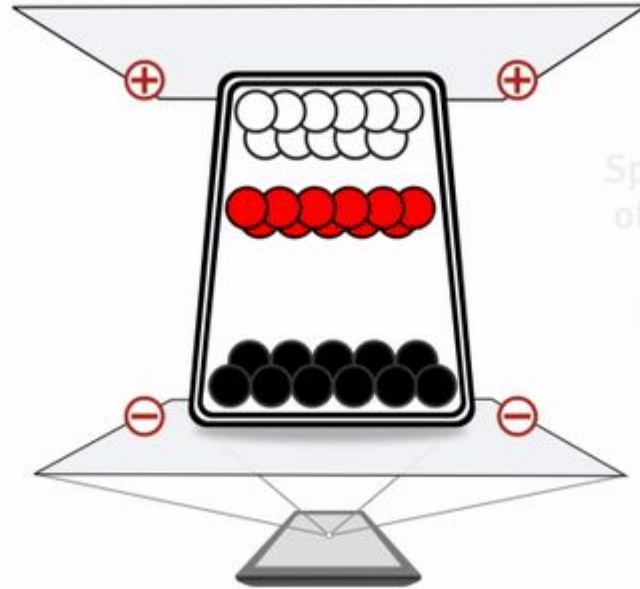
A (Brief) History of E-Ink

- Developed in 1997 at the MIT Media Lab
- First patent filed in 1996 (almost all patents exclusively held by E Ink Corporation at this point)
- Uses changes in electric charges to move pigments from top to bottom of transparent microcapsules
- Originally black and white, currently available with up to 32,000 colors (Advanced Color ePaper)

Different E-Ink Systems

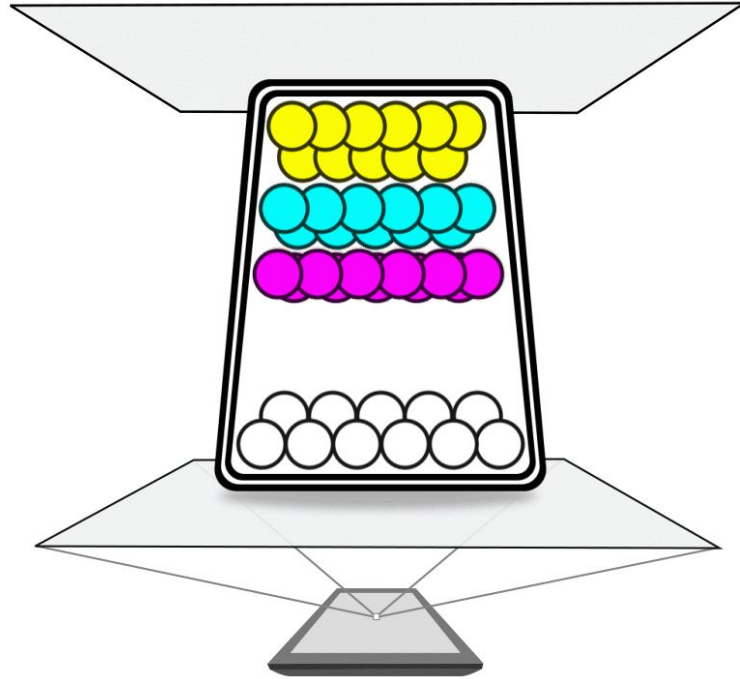


Different E-Ink Systems



Spectra displays are made
of millions of Microcups®
which suspend the
pigments in clear fluid

Different E-Ink Systems



State of the Art - Flexible Displays



<https://www.youtube.com/watch?v=5qOSGyrlgMo>

State of the Art - 31.2" color ePaper Display - \$2300

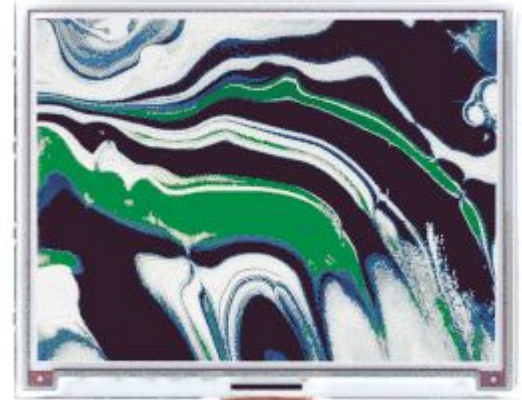


Dasung E-Ink Monitor - Paperlike \$1000 - \$1100



<https://www.youtube.com/watch?v=vnUACe8Bsyg>

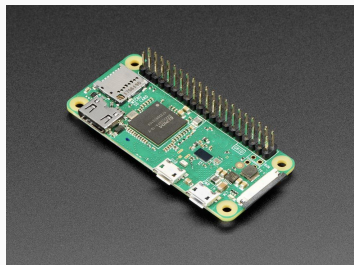
What you can get: Pimoroni



Materials

(https://github.com/m-clare/NGW_E_Ink_Workshop)

- Raspberry Pi Zero WH



- Pimoroni e-ink display
 - (pHAT or wHAT)



- MicroSD card with Raspberry Pi OS and wifi enabled*

- 5v power supply



Connecting to your Pi Zero W

Prerequisites:

Pi Zero W connects to your Wifi and has SSH enabled!

<https://code.mendhak.com/prepare-raspberry-pi/>

<https://desertbot.io/blog/setup-pi-zero-w-headless-wifi>

Note for Windows!

SSH using either:

PuTTY

Powershell

Connecting to your Pi Zero W

If you *don't* know your pi name and password:

Default login:

```
$ ssh pi@raspberrypi.local  
pi@raspberrypi.local's password: raspberry
```

If you know your pi name (and password):

```
$ ssh pi@{$HOSTNAME}.local
```

Connecting to your Pi Zero W

To get out of your pi:

```
pi@raspberrypi: ~$ exit
```

Pushing Code to your Pi Zero W Using SCP

SCP

```
$ scp /path/to/local/file.txt pi@{$HOSTNAME}.local:target/directory
```


Cloning the repos

Ssh into your pi:

```
$ mkdir workspaces && cd workspaces  
$ git clone https://github.com/m-clare/NGW_E_Ink_Workshop.git  
$ git clone https://github.com/pimoroni/inky.git  
$ cd NGW_E_Ink_Workshop  
$ pip3 install -r requirements.txt
```

The Inky Library

Sample scripts: Inky wHAT

```
$ cd inky/examples/what
```

Sample scripts: Inky pHAT

```
$ cd inky/examples/phat
```

The Inky Library

Missing packages for demos...

fonts

quotes

weather

A hand-drawn smiley face in a monospaced font, consisting of a tilde (~) followed by an underscore (_), a pair of parentheses containing a curved line for a smile, another underscore, and a final tilde.

```
$ pip3 install font-$FONT-NAME
```

```
$ sudo apt install python-lxml
```

```
$ sudo pip3 install wikiquotes
```

```
$ pip3 install geocoder
```

Working with Pillow

<https://pillow.readthedocs.io/en/stable/handbook/index.html>

- Images can be manipulated (stretched/shrunk) to canvas size
- Images can be copied and pasted based on available canvas size (do the math!)
- Images **must** be fit to Pimoroni resolution to render
- Images **must** be converted to a Pimoroni friendly palette

Making Images

<https://pillow.readthedocs.io/en/stable/handbook/index.html>

- Necessary imports: Image, ImageDraw, ImageFont
- Upper left corner = (0, 0)
- Image can be rotated before pushing to Inky to put power cord at the top
- Sample images available in Inky demos (and a Recurse icon is provided in assets!)

Your Calendar Token

[People & Events](#)
[Discussion](#)
[Resources](#)
[Career services](#)
[Outreach](#)
[Admissions](#)
[Donate](#)
[NGW 2021](#)

Marianne Wachter

Settings

Update your name, dietary preferences, current employer, etc.

My RC profile

Only members of the RC community can see this

My jobs profile

Only employers can see this

Logout

3:00pm - 7:00pm
philo maths : exploration group

8:30pm - 9:00pm
A Test Event

TOMORROW

3:30am - 4:00am
NGW Coffee Klatschl!

8:00am - 9:00am
NGW 2021 Welcome!

9:00am - 9:30am
State of RC talk

9:30am - 10:00am
NGW Meet and greets

10:00am - 12:00pm
NGW E-Ink Workshop!

12:00pm - 1:00pm
Missing Lectures Work Space

12:00pm - 1:00pm
Missing Lectures Work Space

[General settings](#)[Profile settings](#)**[Calendar settings](#)**[Jobs settings](#)[Employer settings](#)[Change password](#)[Apps](#)[RC Scout](#)[Heap Community Cluster](#)

Calendar settings

To have events from the RC calendar appear on your calendar software, copy and paste the URL below into its subscription feature. You only have to do this once. After that, your calendar software will automatically download changes from [recurse.com](#) periodically. See specific instructions for [Google Calendar](#) and [macOS Calendar](#).

Subscribe to



All events



Only events I'm attending

Select which events from the RC calendar the URL below will include

Subscription URL

<https://www.recurse.com/calendar/events.ics?token=def913ab2>

Paste the URL above into the subscription feature of your calendar software.

SAVE SETTINGS

Template Code

Your .env file: .env

```
ICS_TOKEN='abc0234...'
```

poller.py

```
load_dotenv(.env)
```


Template Code

Main script: poller.py

fetch_calendar

- does what it says on the tin!

fetch_formatted_text - baseline pretty printing

- can be modified to accommodate your taste - get creative!

Pushing Code to your Pi Zero W Using SCP

SCP

```
$ scp /path/to/local/file.txt pi@{$HOSTNAME}.local:target/directory
```

Running your script (...for a long time)

```
$ python3 poller.py
```

