

Text Message • RCS  
Mon, Dec 1 at 12:13 PM

You guys available 1-3pm today?

Corban Swain

CS

Yes

Shahar Bracha

SB

Yes I'm here

Ok let's resume building today then?

Shahar Bracha

SB

I just need to finish something on the 4th floor, I will join in 20 min

Corban Swain



CS

Text Message • SMS  
Mon, Dec 1 at 5:15 PM

Had a phone call then gym . Sorry about that. will be much more available tomorrow . We should also sit down briefly to finalise ordering parts for imaging path and a rough timeline for what we can do before the holidays

Sent as Text Message

Text Message • RCS  
Tue, Dec 2 at 10:19 AM

Corban Swain

CS

Woke up late, headed in now on T

Will get there around 11 myself

Shahar Bracha

SB

I'm teaching until 12 and then have work in the fish facility - feel free to start without me

Wed, Dec 3 at 1:55 PM

Corban Swain

Great Job!

CS

I'm free to build today, I just want to start some 3D prints first

CS

Great Talk @Quilee!

Shahar Bracha

SB

Yep, great group meeting!! It was very well put together

Text Message • SMS

@Corban I'll be in at ~4pm will that still work?

Sent as Text Message

Text Message • RCS

Corban Swain

CS

I have some meetings tonight but I can work until 5:15 ish

Shahar Bracha

SB

I can join 4-5

Will be there in 15

Don't wait for me to start though

Wed, Dec 3 at 6:29 PM



IMG\_8625.HEIC

Image · 2.2 MB



IMG\_3803.png

PNG Image · 395 KB



Part I worked on



78649746296\_\_DF06E5A1-8316-4F  
B4-AEC8-C7125B413ADA.HEIC

Image · 2.8 MB



IMG\_8807.png



IMG\_0907.png

PNG Image · 466 KB



Part shahar worked on



78649752322\_581E3FCA-7117-48C8-B08D-CF13524919BC.HEIC



Image · 2.6 MB



IMG\_2896.png

PNG Image · 238 KB



Part already there

And so I guess next ie tomorrow is putting them all together like this, right?



IMG\_0502.png

PNG Image · 774 KB



Thu, Dec 4 at 11:54 AM

I'm here

Corban Swain



Meeting for 20 more min



Walking back

Thu, Dec 4 at 7:53 PM

Corban Swain

Progress this evening



IMG\_3049.heic

Image · 1.6 MB



IMG\_3047.heic

CS



IMG\_3047.HEIC

Image · 1.6 MB



Fri, Dec 5 at 9:26 AM

I'm leaving home now

Will be in lab around 10:30

Hello. Today I plan to place the order **Corban**. I won't go through the list too carefully since it seemed like you already did and it's under 10k.

Corban Swain

CS

Sounds good, about 30 min away myself

Shahar Bracha

SB

I'm doing embryo injections and imaging so can't join today, I'll try to stop by in the afternoon if you're there

Mon, Dec 8 at 10:23 AM

What time today works for us to continue **Corban**?

Corban Swain

CS

I think around 1:30

Doing wedding tasks at home 😊

About to head in now.

Mon, Dec 8 at 1:38 PM

Corban Swain

CS

I'm around now

I should be there at 3

Sent as SMS

Text Message · SMS

Let's align today Corban and I

Text Message · RCS

I'm here

Mon, Dec 8 at 10:42 PM

Shahar Bracha

SB

Sorry I haven't been able to join today - this week I should be able to join on Thursday afternoon or Friday anytime

Corban Swain

We have a sheet Of light!!

CS



IMG\_3097.heic

Image · 223 KB



Photos



IMG\_8660.jpg

JPEG Image · 530 KB



IMG\_8663.MOV

Video · 130.5 MB

SB

Shahar Bracha

Woah cool!!



IMG\_8661.MOV

Video · 9.8 MB

Sent as SMS



IMG\_8657.HEIC

Image · 1.6 MB

Sent as SMS



IMG\_8658.HEIC

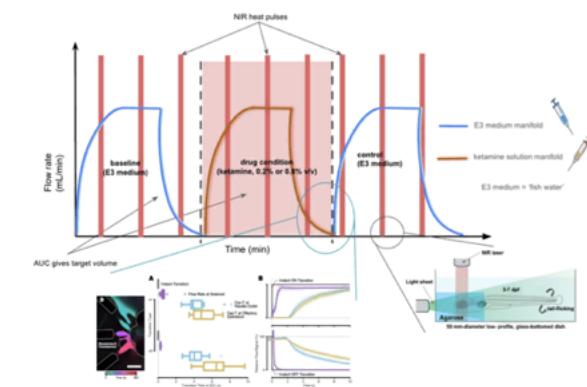
Sent as SMS

Text Message · SMS  
Wed, Dec 10 at 11:45 AM

PS for the behavior and SPARC fish stuff from the meeting with Ed. Attaching my thesis proposal but I don't plan on doing the complicated rig thing anymore. Simply want to bathe the fish in some drugs - image - wash out with fish water - image - more drugs. Corban could we set up an NIR laser next to the fish sample holder set up ?



Experimental timeline showing the temporal structure of solution switching, drug delivery, behavioral probing, and neural recording phases during a single experiment.



**Figure 2. Temporal structure of a single experiment integrating drug delivery and behavioral probing.** Fish are initially perfused with control solution (E3 medium or 'fish water') for baseline recording, followed by bath application of ketamine (0.2% or 0.8% v/v), and finally washed back into control medium. A fluidic manifold controls switching between reservoirs, achieving near-complete bath exchange within ~1-2 minutes. Red vertical bars indicate periodic IR heat pulse stimuli (e.g. ~5 seconds each, spaced ~1 minute apart) to the larva's head used to assess behavioral responsiveness (tail-flick reflex) throughout baseline, ketamine, and recovery phases. This structure mimics anesthesia induction and emergence phases, allowing each fish to serve as its own control. **Main figure:** Blue and brown traces indicate the flow of control E3 medium and ketamine solution, respectively, as a function of time. The transition phases (dashed lines) involve simultaneous inflow of new solution and removal of old solution. In each trial, after an initial baseline period in E3, ketamine is introduced (pink shaded region) and maintained for a set duration (e.g. 5–10 min) before switching back to E3 for



imeon Thesis Proposal

washout. Two ketamine dose conditions are planned: a sub-anesthetic dose (0.2% v/v ketamine) and a higher anesthetic dose (0.8% v/v), each tested in separate trials. **Bottom-right inset:** The head of the zebrafish is encased in low-melt agarose, leaving the tail free to move. Heat produced by an NIR laser causes the unconditioned response of tail flicking in normal, awake zebrafish. **Bottom-left inset:** We will validate the capacity and timing of our modified ZOSS setup to deliver and withdraw the desired bath concentrations and volumes by performing synthetic dye (e.g. rhodamine B) quantification to determine delays in the transition times for switching between bath solutions. *Made with Biorender.com and with figures adapted from Swain (2024) and Dempsey et al. (2022).*

Not Delivered

Text Message · RCS



IMG\_2795.png

PNG Image · 542 KB



PS for the behavior and SPARC fish stuff from the meeting with Ed. Attaching my thesis proposal but I don't plan on doing the complicated rig thing anymore. Simply want to bathe the fish in some drugs - image - wash out with fish water - image - more drugs. **Corban** could we set up an NIR laser next to the fish sample holder set up ?

**Shahar** this was my original idea/motivation for SPARC in C elegans. If we can make a fish line that is essentially that , we could do this experiment



IMG\_0191.png

PNG Image · 360 KB



Wed, Dec 10 at 3:18 PM

Shahar Bracha

SB

Will this still be a relevant approach for a brain with so many more neurons and unknown and variable connections? How do you envision interpreting these kinds of data, especially given the fact we might only be able to record a minute or a couple of minutes of activity before photobleaching? I think it will be worth discussing with everyone

Corban Swain

CS

Headed to the lab now

Wed, Dec 10 at 9:56 PM

Corban Swain

CS

Remind me that we need to realign a part of the system due to the spacer holding the target offset when we did initial alignment

Thu, Dec 11 at 9:06 AM

SB

Will this still be a relevant approach for a brain with so many more neurons and unknown and variable connections? How do you envision interpreting these kinds of data, especially given the fact we might only b...

Even if we didn't interpret it. Just having and publishing such a dataset would be first of its kind .

I'm arriving at 10am today

What about you @Corban?

Thu, Dec 11 at 11:07 AM

Corban Swain

Apologies for the delay

CS

Aiming for 1230 arrival

Thu, Dec 11 at 12:42 PM

Corban Swain

CS

Here

CS

In the scope room now, unpacking

Can join next at 3

Shahar Bracha

SB

I'm coming

Thu, Dec 11 at 5:16 PM

Shahar Bracha

SB

I'm around until 6

Corban Swain

CS

Gonna do one last thing now

What is that?

Corban Swain

Check alignment and begin assembly of the imaging path

CS

I'll probably head out shortly after 6

Fri, Dec 12 at 11:32 AM

Shahar Bracha

SB

When do you want to work on the microscope today?

Whenever @Corban is ready

Corban Swain

CS

I'm headed in now sincerely apologize for the bottleneck!

Shahar Bracha

SB

Sounds good! I'm omw to the lab too now

I'll be there at 2 PM

Here

Corban Swain

CS

Hey are you here shahar?

Shahar Bracha

SB

Sorry got stuck on the way, ill be there soon

Mon, Dec 15 at 1:13 PM

Hey can you guys work on the imaging oath today without me? I'm not feeling well and will come in tomorrow

Shahar Bracha

SB

I am available today 3-7 (with short meetings at 3:30 and 4:30) to work on the scope

Mon, Dec 15 at 2:23 PM

Corban Swain

CS

Similar availability for me

Mon, Dec 15 at 6:39 PM

Shahar Bracha



7875645360861929628.jpg

JPEG Image · 428 KB



2884704544131081633.jpg

JPEG Image · 381 KB



SB

We assembled the last lens, did a rough alignment of these cages and the mirror, and installed the first two lenses

SB

Tue, Dec 16 at 9:50 AM

Tue, Dec 16 at 9:00 AM

What time today?

Was thinking we can also spend an hour on the grant writing together?

Read

Corban Swain

I have an event this morning, should be in by 1 PM

CS

I have an event this morning, should be in by 1 PM

Tue, Dec 16 at 12:23 PM

Shahar Bracha

SB

I have lab work and meetings until 4, happy to join at the scope after

Tue, Dec 16 at 4:31 PM

Shahar Bracha

SB

I'm free now

Ok please start without me. I'm manning office hours until 5pm

Tue, Dec 16 at 7:05 PM

Shahar Bracha

SB

My availability for the rest of the week for joining on the scope:  
Tomorrow 9a-2p and 4:30-6  
Thursday 1-5p  
Friday 8:30-10:30a

Wed, Dec 17 at 12:02 PM

Corban Swain

I'm on my way in now. I think I can just build from now until like six or seven.

tomorrow I'm gonna focus on writing my part of the grants.  
Unfortunately, I have meetings Friday morning, but can work Friday afternoon.

I'm on my way in now. I think I can just build from now until like six or seven.

tomorrow I'm gonna focus on writing my part of the grants.  
Unfortunately, I have meetings Friday morning, but can work Friday afternoon.

Should be there by about 1230 today

CS

Should be there by about 1230 today

Great I'll join building with you at 2 after my last meeting for today

Let's try to get a lot built today!

Corban Swain

CS

Skated in but forgot shoes alas headed to garment. District should be back within 10 minutes.

Shahar Bracha

SB

I'm in the w1, finishing soon

Corban Swain

CS

Here at desk

Thu, Dec 18 at 12:39 PM

What time are you writing from Corban?

I'm available to build after 5

Also from 1-3 just let me know soon

Shahar Bracha

SB

I'm in the lab until 5 today

Corban Swain

Writing Now till end of day, not sure how much I can be around until Friday after the grant meeting

CS

Writing Now till end of day, not sure how much I can be around until Friday after the grant meeting

Feel free to try to continue putting together the two camera paths without me, I left the documents out.

CS

Don't try to mount the elliptical mirror, there's an issue. I reached out to Thorlabs.

Fri, Dec 19 at 12:15 PM

Corban Swain

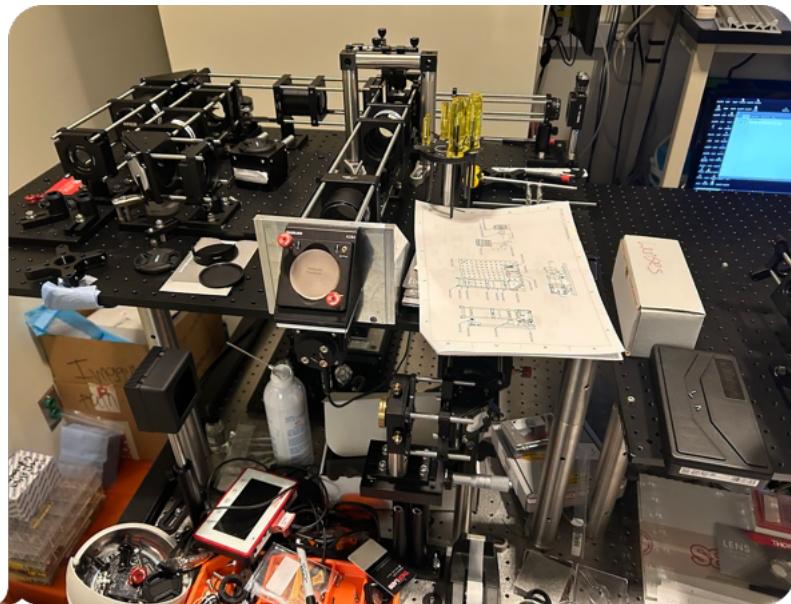
CS

Heading in now

Mon, Dec 22 at 9:39 PM

Corban Swain

Corban Swain



CS

Nice

When are cameras gonna be put ?

Corban Swain

CS

Cameras can be dropped in whenever, one of the mounts is there.  
But they need to be out of the way for initial alignment

Tue, Dec 23 at 10:52 AM

Are you in today too or already on vacation ? Asking cause I'm  
already out of the state

Corban Swain

Yes, going in today

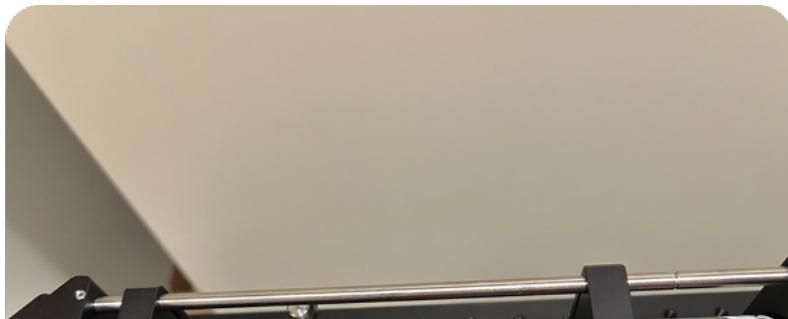
CS

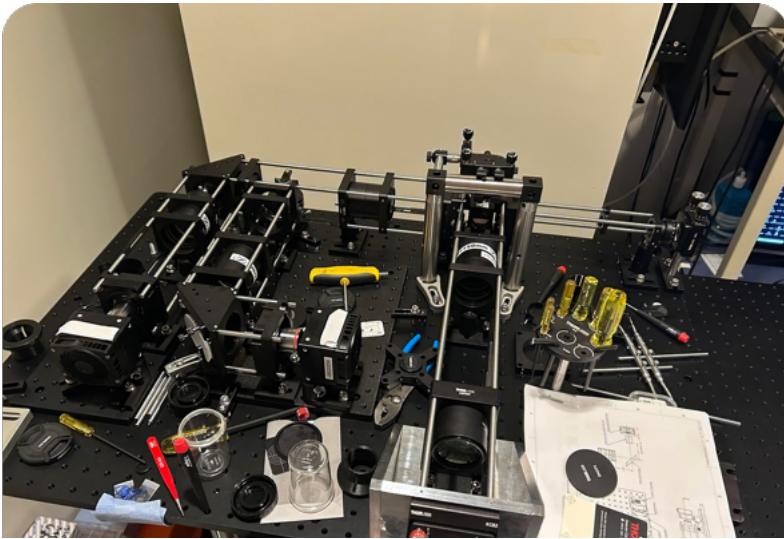
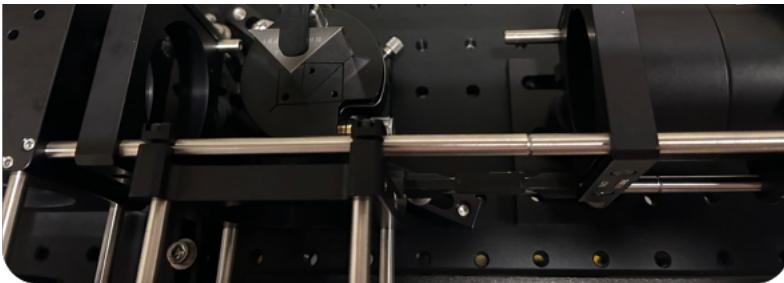
Yes, going in today

Do you think you have time to set up alignment and cameras? If  
you can record a video for me that would be great but no worries if  
not. I'm going to fill out the Imaging attachment for the addendum  
and see if I can send that to you to look over.

Tue, Dec 23 at 6:55 PM

Corban Swain





CS

Corban Swain

CS

Imaging path is aligned via laser with the exception of remote refocusing objective

Bless

CS

Imaging path is aligned via laser with the exception of remote refocusing objective

Because we need to still mount/glue that one?

Tue, Dec 23 at 8:21 PM

Corban Swain

CS

I decided to align with just a mirror and not objective because 1) I can get a longer distance to check colinearity  
2) i think it will be a bit easier to align everything first then add objects (we'll see lol)

The system should form an image now, just no remote refocus. I might add a bit more tomorrow.

CS

I decided to align with just a mirror and not objective because 1) I can get a longer distance to check colinearity  
2) i think it will be a bit easier to align everything first then add objects (we'll see lol)

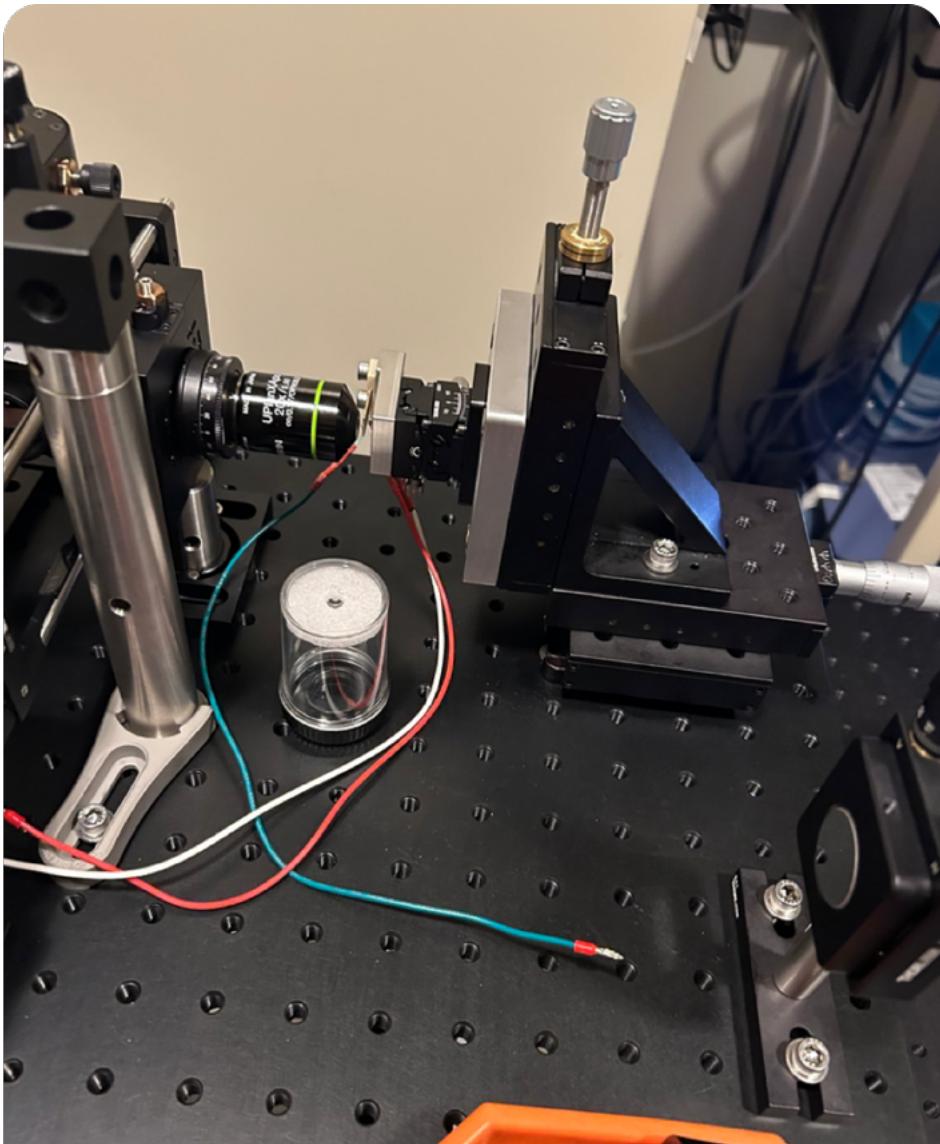
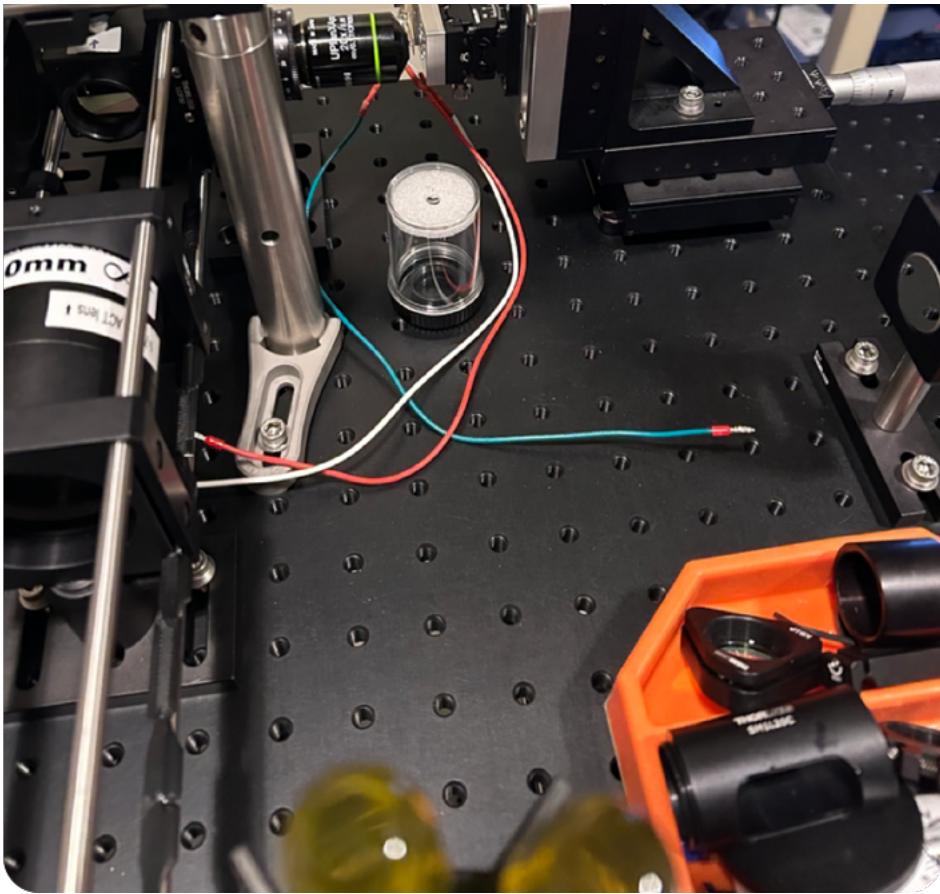
The system should form an image now, just no remote refocus. I might add a bit more tomorrow.

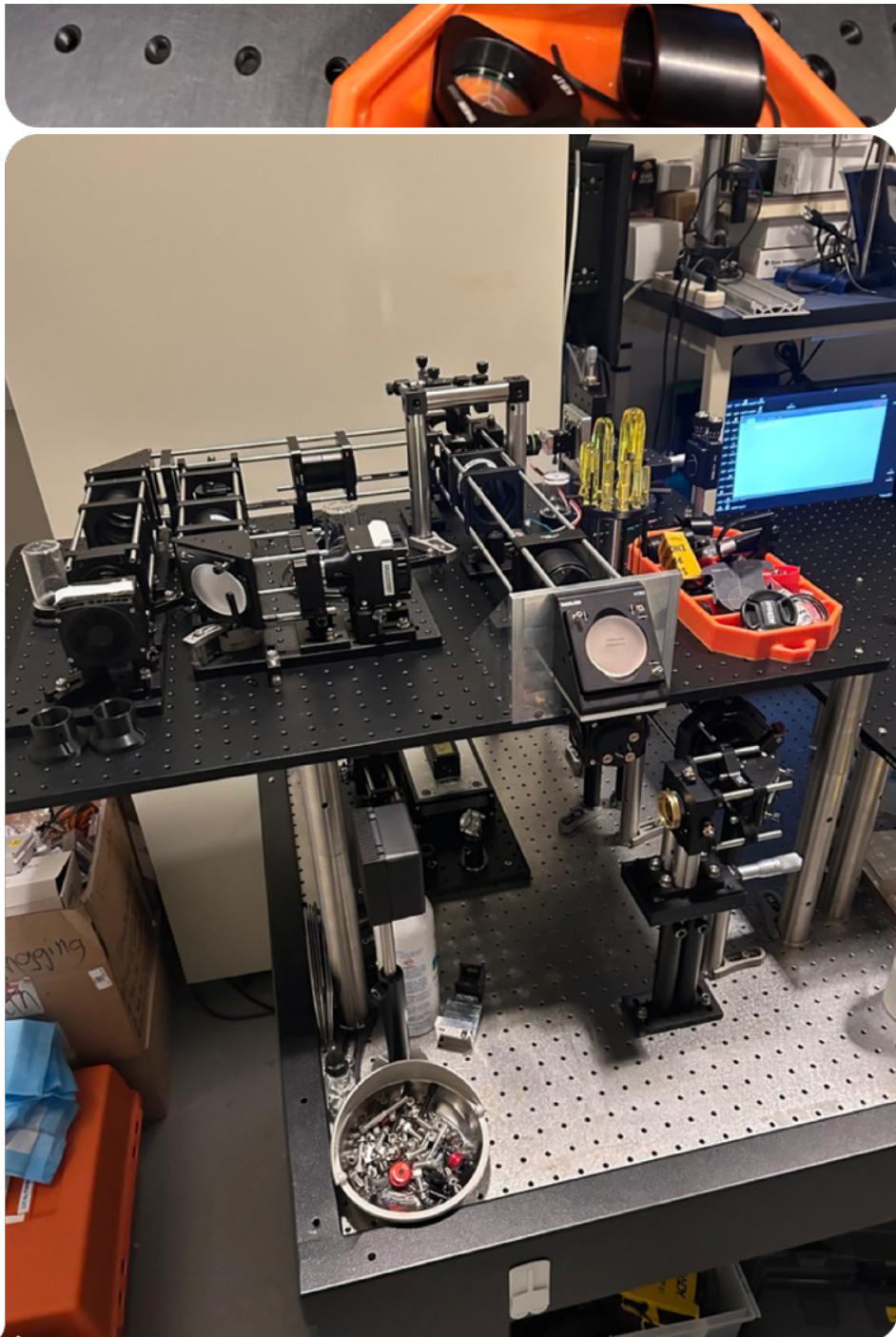
Thank you!

Wed, Dec 24 at 7:28 PM

Corban Swain







I got a piezo bender with a mirror already mounted on it from Zeguan. However, the piezo is broken, so it can only be used for static imaging. That being said, pretty much everything is set up, and I'd say 90% aligned. I'm not sure how much the alignment will shift once we actually are imaging instead of just pointing a laser through. But Zeguan is going to mount the bender for us, the mirror on our bender, that is, over break.

I probably won't be back until around the 15th after the wedding and honeymoon. But I can try and touch base for the next couple days as needed.



Thanks so much

I'll be back the week of the 2nd

Mon, Dec 29 at 1:39 PM

Hope you had a great Christmas/Hanukkah

Wed, Jan 7 at 10:45 AM

Corban Swain



CS

CS

Should be back from honeymoon around 1/15 ❤️

CS

Should be back from honeymoon around 1/15 ❤️

Congrats on your marriage, You both look wonderful. Wishing you abundant joy and happiness

Wed, Jan 7 at 1:18 PM

Shahar Bracha

SB

Congratulations Corban! You two look so happy and beautiful ❤️ enjoy your honeymoon!!

Thu, Jan 15 at 10:25 AM

Corban Swain

Thanks,

Back to the lab today!

Thanks,

Back to the lab today!

CS

Awesome. Exciting. Thinking we should have a regroup meeting tomorrow to assess where things are. The next thing we need to do is set up the three workstations Zeguan has provided us, and start with seeing up the Piezo controller hardware and software.

Corban Swain

CS

Sounds good, I may start setting up cables for the NIDAQ and running power as needed to various things.

Yes that would be great thank you!

Wed, Jan 21 at 8:20 PM

Hey Shahar are you authorised to use the ketamine? If not, can you get trained on it (not sure process now Doug gone) so that we are ready to run experiments once equipment set up?

Corban Swain

CS

Also **Shahar** are you able to look for one more monitor? There's a weird mounting issue that we could avoid if we find one more just let me know.

I shared a block diagram via Miro of the electronics in the system with both of you. It's about 70% done as of now.

Also Shahar are you able to look for one more monitor? There's a weird mounting issue that we could avoid if we find one more just let me know.

CS

I shared a block diagram via Miro of the electronics in the system with both of you. It's about 70% done as of now.

Awesome. The Digi key order is delayed.

Thu, Jan 22 at 12:12 AM

Shahar Bracha

Yes there were a few more people that told me last time that have a monitor, I'll check back tomorrow

SB

I've not done the training for ketamine. Is there an Atlas class?

Thu, Jan 22 at 11:33 AM

I forwarded you the email

But yes @Shahar this one Controlled Substance Use In Lab (EHS 00290).

Fri, Jan 23 at 2:42 PM

Corban Swain

The electronics diagram is pretty much done. I'll try to place the order for the couple of remaining components which that shows we need by next Monday.

Let me know when you find the Monitor **Shahar**.

The electronics diagram is pretty much done. I'll try to place the order for the couple of remaining components which that shows we need by next Monday.

CS

Let me know when you find the Monitor Shahar.

Mon, Jan 26 at 12:08 PM

Hey guys. Hope you're doing okay with the snow. I know MIT is closed, but are you guys going in/already in?

Corban Swain

CS

No I'm home

Tue, Jan 27 at 2:30 PM

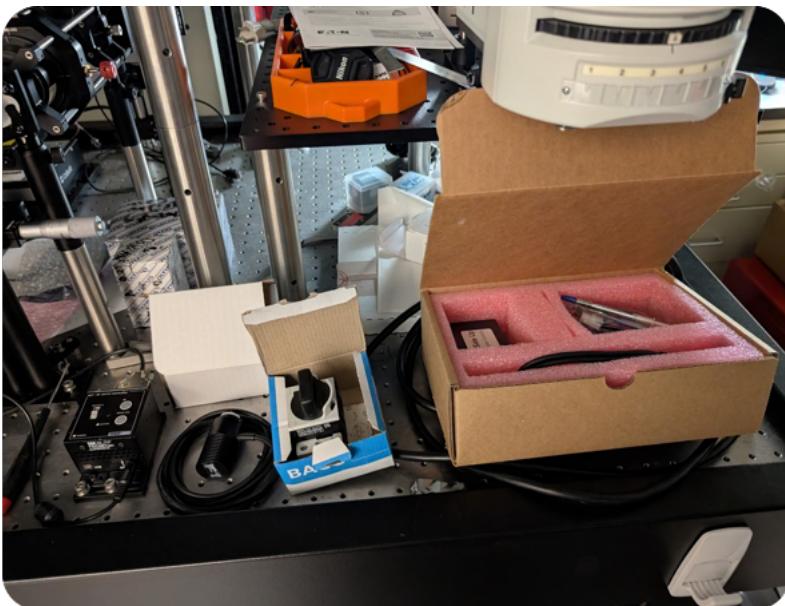
Corban Swain

Taking a sick day FYI, under the weather

CS

Hope to still place parts order

Shahar Bracha



SB

Got a second screen

Corban Swain

CS

Great!

Corban Swain

Replied to a message:  
One more photo of all the cables in this box?

CS

Laid out possibly?

Corban Swain

CS

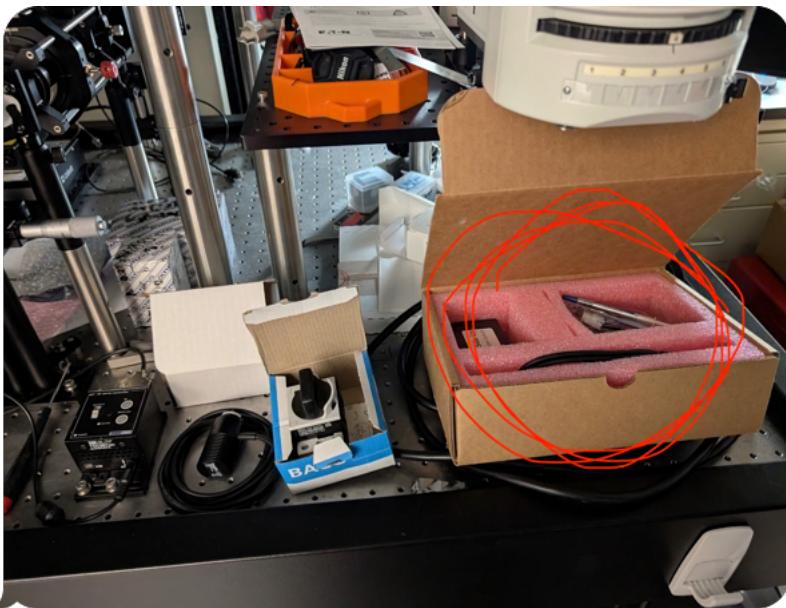
Replied to a message:  
Laid out possibly?

Shahar Bracha

SB

Is this one of the boxes in the image I sent? Which one?

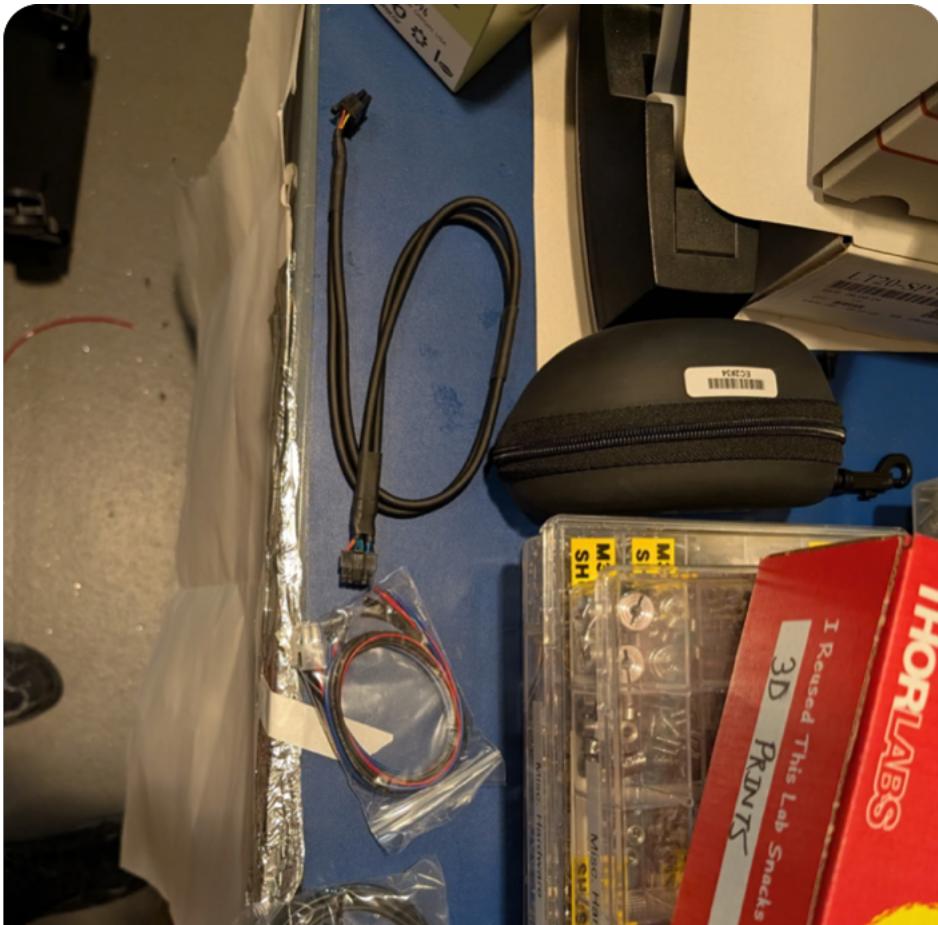
Corban Swain



CS

Yes, Brown box with pink foam

Shahar Bracha





SB

Wed, Jan 28 at 2:42 PM

Thinking about what you said Corban. Let's start writing. Let's start with a blog post. "We (re)built a remote scanning light sheet microscope to image voltage in a whole brain. From scratch. Here's how..." and go from there . We release full details and artefacts from this process like 3D files , complete parts lists, circuit diagrams, etc."

Corban Swain

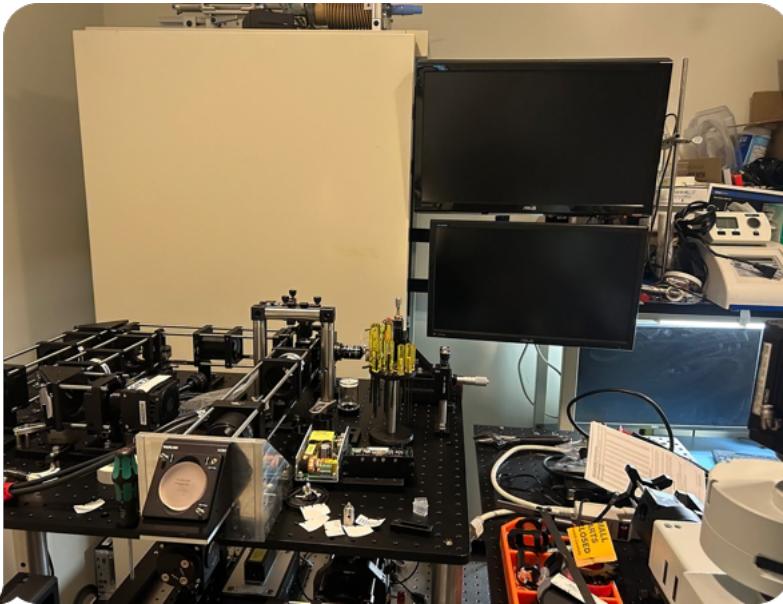
CS

Loved an image

Friday 7:16 PM

Corban Swain

Monitors remounted and rack cleared!



CS

Beautiful

Shahar Bracha

SB

❤️ to a photo

Today 10:46 AM

Hey any updates?

Corban Swain

Replaced the rack plug and re rerouted the air line.

Ran cabling for all the computers and power for cameras





CS

Continuing assembly today

CS

Also started prepping some of the circuit boards

CS

All the computers now turn on

What about installing software? Are we ready to do that with Zeguan

Corban Swain

CS

No, I think we should get all the electronics connected first

Shahar Bracha

SB

Quilee, do you know where the ketamine is stored at the moment?

In the drug lockbox

Ask Caroline or Zeguan

Today 1:59 PM

Corban can you send me a PDF of the miro, when I try to download it gives me something that is cropped. Maybe you can as the owner download it better?

Corban Swain

CS

Yes let me see

Today 5:15 PM

Corban Swain

Galvo board is mounted and partially wired



