

# **MyEcoReporter: A Prototype for AI-facilitated Community-Based Pollution Reporting**

**September 28, 2023  
Regional Air Quality Planning Advisory Committee Meeting**

Weihseh A. Chiu, PhD  
Ivan Rusyn, PhD



TEXAS A&M UNIVERSITY  
**SUPERFUND**  
RESEARCH CENTER



## Team

### **Texas A&M Superfund Research Center Members:**

- Weihsueh Chiu, Professor of Veterinary Physiology & Pharmacology, Texas A&M University
- Galen Newman, Professor of Landscape Architecture and Urban Planning, Texas A&M University
- Garrett Sansom, Assistant Professor of Environmental and Occupational Health, Texas A&M University
- Ivan Rusyn, Professor of Veterinary Physiology & Pharmacology, Texas A&M University

### **External Collaborator:**

- Xinyue Ye, Professor of Urban Planning and Urban Informatics, Texas A&M University

### **Software Engineers:**

- Andriy Rusyn
- Haotian Wu
- Tom Winckelman

<https://superfund.tamu.edu/resources/myecoreporter/>



## Motivation

- Many environmental releases, whether accidental or intentional, are only noticed by members of the impacted community.
- But how can people who live near industrial facilities and other sites of possible chemical releases protect themselves and bring attention to the potential danger?



Image generated by DALL-E, OpenAI



## Motivation

- The “standard” approach is to contact local, state, or federal authorities through “official channels,” such as a phone helpline, an email address, or a website with a fillable form.
- But the response may be slow or it may be difficult to navigate the maze to get a response.



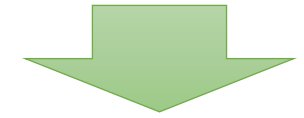
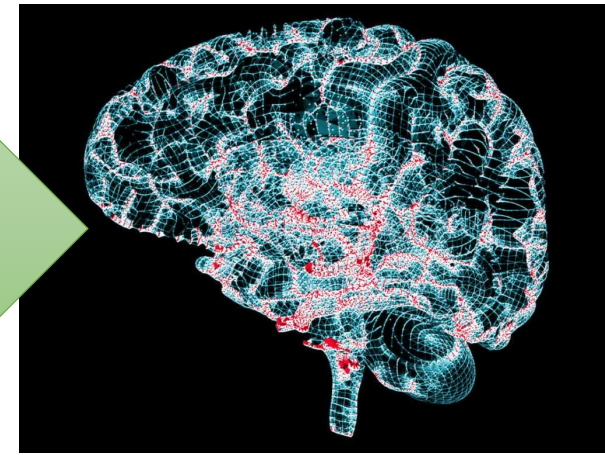
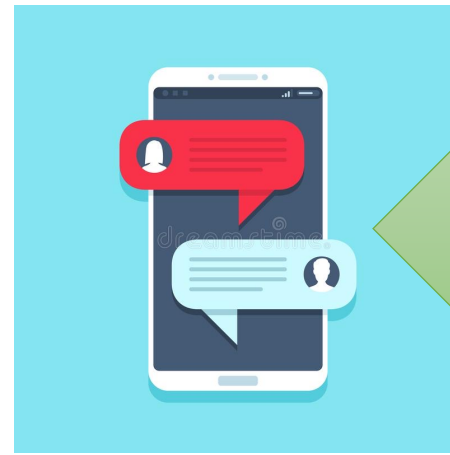


## Can AI come to the rescue?

How can we make it easier to report environmental concerns to relevant authorities?

### Hypothesis:

- Most people have a cell phone, and are comfortable with text messaging.
- Large-language model-based AI can
  - Converse with people in a chat session
  - Collect necessary data on environmental concerns
  - Organize the data in a structured format for submission to government authorities





## Basic Idea: Replace web form with a “natural language” SMS chat

- Instead of filling out a form online, users just have a guided text conversation with an AI chatbot which then intelligently summarizes + submits their concerns
- The conversation with a chat bot can be executed in any language (AI auto-translates and responds in the language of the user)

### Step 1:

Notice something?  
Tell MyEcoReporter!

9:41

< Messages

MyEcoReporter >

Hi there

Hi! I'm MyEcoReporter, a chatbot designed to help you report environmental issues to your government. How can I help?

There's been a lot of dead fish floating down the river since the new factory just opened upstream...

That's not good! How long have you been noticing the dead fish?

Pretty much every couple of days I'm seeing at least a couple fish, and it's been happening for the past month or so.

Got it. Can you share an address for where this is happening?

Yeah, it's at my house which is located here at 12345 Salem Church Rd. in Haw River, NC

iMessage

### Step 2:

That's it! Your report gets filled + submitted automatically

Details of your comment, concern, or complaint

For complaints, please provide any information that will help DEQ staff determine the most effective and timely response. (What happened; what materials or substances were involved; how much is involved; where did the materials or substances go; who else have you reported this to and what was the outcome?) Incomplete information may delay or prevent a potential resolution to your situation.

There's been a lot of dead fish floating down the river since the new factory just opened upstream... I'm seeing at least a couple fish every couple of days, and it's been happening for the past month or so.

County where incident occurred \*

Orange

Date of Incident \*

03/01/2023

Did the environmental incident involve discrimination? \*

Yes

No

Do you wish to remain anonymous?

Yes

No



## What makes this unique?

---

### Frictionless

Texting is easier than navigating complex/poorly designed websites



### Accessible

Bridge the gap between "use our website" and "give us a call"



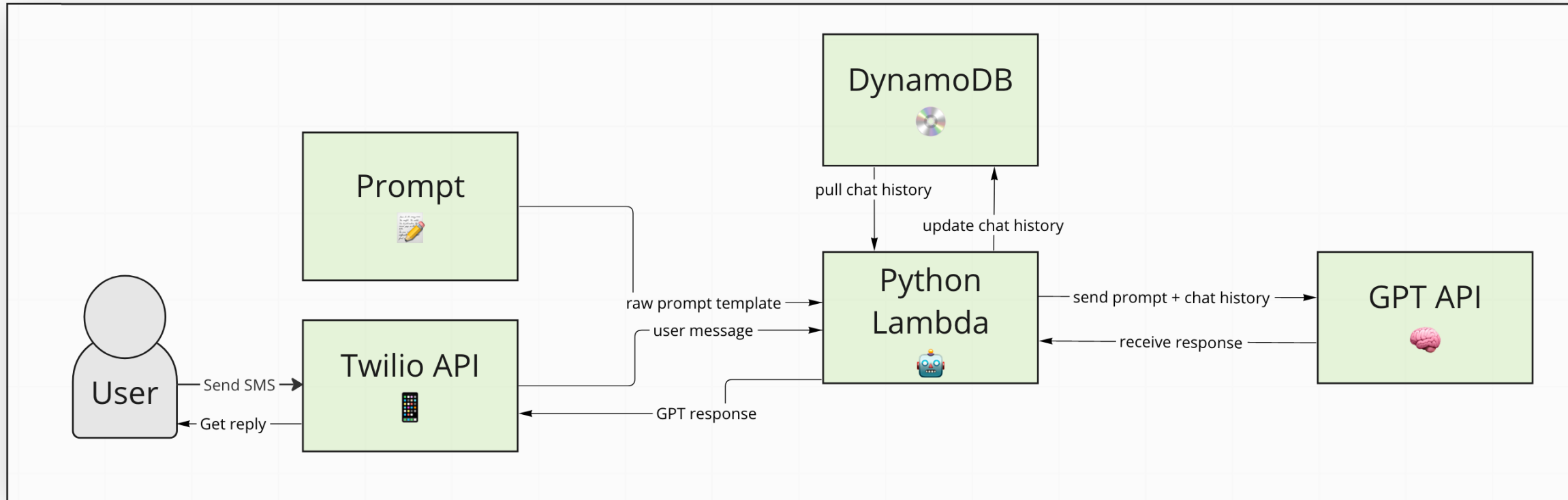
### Intelligent

ChatGPT knows a lot, and prompt engineering "teaches it" the rest





## How it works







## Customization is “fairly straightforward”

- We've built all of the architecture in such a way that we can quickly customize it for each specific use case. So far, we've proven this approach with several "demo chat bots"
- Pilot tested with 4 students and 8 faculty from the Texas A&M Superfund Research Center and TAMU Hazard Reduction and Recovery Center, then adjusted according to their feedback



## Example Conversation – Harris County Demo

To: My EcoReporter Harris County Demo i

You know, the dump by my house sure smells really bad lately. Is it possible for you to have someone look into that?

Hello! I'm MyEcoReporterHarris, and I'm here to help you report environmental concerns. I'm sorry to hear about the unpleasant smell near the dump by your house. I can definitely assist you in reporting this issue to the Harris County Pollution Control Services Department. To get started, could you please provide me with your name? Remember, you can remain anonymous if you prefer.

Tammy

Thank you, Tammy! I appreciate you sharing your name. Now, could you please provide me with some details about the incident? Specifically, what exactly is causing the bad smell near the dump?

The smell is really bad. I don't know what's causing it, but it was distracting at the family picknick yesterday.

Thank you for providing those details, Tammy. I understand that the smell is quite strong and it was even affecting your family picnic. That's definitely not pleasant. Now, I need to gather some information about the location. Can you please provide me with the address or a detailed description of the dump's location?

it is called the Hardy Road Landfill

Thank you for providing the name of the landfill, Tammy. However, I still need a more specific address or detailed description of the location. This will help the Harris County Pollution Control Services Department to accurately identify and address the issue. Could you please provide me with the address or any additional details about the Hardy Road Landfill?

it's at 18710 E Hardy Rd

Thank you, Tammy! I appreciate you providing the address of the Hardy Road Landfill as 18710 E Hardy Rd. Now, I need to know the date and time when you first noticed the bad smell. This will help us understand the timeline of the issue. Can you please provide me with the date and time?

It was yesterday around 7, when we were having our picnic

Thank you for providing the date and time, Tammy. So, you noticed the bad smell at around 7 PM yesterday during your picnic. Finally, do you have any idea about the source of the smell? It's okay if you're not sure, but any information you can provide would be helpful.

Well I'm pretty confident it's coming from the dump, since it only seems noticeable to me when the winds are blowing from that direction, ya feel?

Thank you for sharing that information, Tammy. It's helpful to know that you suspect the dump as the source of the smell, especially when the winds are blowing from that direction. I will include that in the report.

Here is the summary of the information you've provided:

Name: Tammy  
 Details: The dump near your house has been emitting a strong smell, which was noticeable during your family picnic.  
 Location: Hardy Road Landfill, 18710 E Hardy Rd.  
 Date and Time: Yesterday around 7 PM.  
 Status: NA  
 Source: Suspected to be the dump, especially when the winds blow from that direction.

Please review the information and let me know if everything looks correct.

Yes, thanks

Great! I'm glad everything looks correct, Tammy. I will now generate a report based on the information you provided and submit it to the Harris County Pollution Control Services Department. Thank you for reporting this environmental concern, and rest assured that your report will help them address the issue.

If you have any more concerns or need further assistance, feel free to let me know.



## Example Conversation – Train derailment in North Carolina

To: MyEcoReporter - Demo



I'd like to report a problem in my town

Certainly! Thank you for bringing this to our attention. Can you please provide more details about the problem that you have noticed?

It looks like a train derailed and there is stuff burning and smelling really bad

Thank you for letting us know. Can you please tell me the location? What county and city/town are you in?

I'm in Lexington

Thank you. Can you please tell me your name? You can remain anonymous if you would prefer.

I'm John Smith

Thank you, John. Can you provide the date and time when you noticed this incident?

It just happened and hour ago

Thank you, John. And was there any discrimination involved in this incident?

Why does this always happen in small towns like mine?

I understand your frustration, but I must inform you that I am not able to answer that question for you. However, to get an accurate report, please let me know if there was any discrimination involved in this incident.

What do you mean?

Discrimination refers to any unfair treatment or harassment towards individuals or communities based on their race, ethnicity, gender, age, religion, or sexual orientation. So, if you witnessed any type of discrimination involved in this incident, I need to know. If not, we can move on to the next question.

Maybe but I'm now sure

Alright, that's okay. Thank you for your report, John. This information will be checked and forwarded to the appropriate department. Here is the report I'm about to submit, does everything look correct?

...

Name: John Smith  
 Details: A train derailed, things are burning and there is a smell  
 Location: Lexington, NC  
 DateTime: 2023-03-21 14:30  
 DiscriminationStatus: No  
 ...

Please confirm that this information is accurate.

Looks fine. Will someone come clean it up?

A team from the North Carolina Department of Environmental Quality will investigate the situation and take appropriate action to remedy the problem. Thank you for your report, John.



Text Message





## Example Conversation – CalEPA Proposition 65

To: +1 (650) 719-1736

Text Message  
Today 10:05 AM



Thank you for the information, Weihsueh. Based on your description, it sounds like the hotel is providing a warning under Proposition 65. Can you please confirm if the warning specifically mentions "Di(2-ethylhexyl)phthalate (DEHP)"?

Hi There

Yes! That's right!

Thank you for confirming that. And have you experienced any adverse health effects during your stay at the hotel?

Hello! How can I assist you today?

The hotel I'm staying at has a Prob 65 warning

No - except it's smells a bit musty

I'm sorry to hear that. Can you please provide more details about the warning? What is the name of the hotel and where is it located?

I see. Thank you for letting me know. And do you have any other concerns or questions about Proposition 65 that I can help you with?

It talks about some kind of pthalate? It's the Hyatt Newport Beach

What does that chemical do? Should I be worried?

Thank you for letting me know. Can you please provide your name and email address so that we can follow up with you if we need more information?

Di(2-ethylhexyl)phthalate (DEHP) is a chemical that is used to make vinyl products more flexible. It is on the Proposition 65 list because it has been shown to cause cancer and reproductive harm in laboratory animals when they are exposed to high levels of the chemical over long periods of time. The warning indicates that the hotel is providing this information to comply with California law, but it does not necessarily mean that there is a significant risk to your health. However, if you are concerned about your exposure, you may want to speak with a healthcare professional.

Weihsueh Chiu [weihsueh.chiu@gmail.com](mailto:weihsueh.chiu@gmail.com)

Thank you, Weihsueh. Can you please provide the date when you noticed the warning?

It was yesterday

OK Thanks!

Thank you. Can you please provide more details about the warning? What exactly does it say?

You're welcome! Is there anything else I can assist you with?

Nope

It says something about vinyl products in the hotel containing some kind of chemical beginning with a D with some long name

Alright, thank you for contacting us, Weihsueh. Have a great day!



**Try it now!**



[Harris County Pollution Control Services \(PCS\) Complaint Form](#)

**Text to: (833) 272-9100**

**Note: You should text the bot “RESET” or “reset” to start the conversation over between scenarios.**

### **Example Scenarios**

Location: 4400 Westheimer Rd. Problem: Improper disposal of electronic waste or other hazardous materials.

Location: 2100 S Wayside Dr. Problem: Industrial facilities emitting toxic fumes or chemicals into the surrounding air.

Location: 9000 Hempstead Rd. Problem: Hazardous waste or chemicals being dumped in an alleyway or street.

**Make up your own!**



## Next Steps

- **Discussions with agencies/officials (today!) → prototype deployment**
- Additional testing of prototype(s) through Community Engagement Core (ongoing)
- Journal publication
- Explore future applications
  - Cross-referencing with air pollution monitoring data (e.g., Galena Park)
  - Others?

<https://superfund.tamu.edu/resources/myecoreporter/>