



# SYSTEMS THINKERS IN STEM

A CONVERSATION WITH:

**DANA LEWIS**

**INDEPENDENT RESEARCHER & INVENTOR OF AN  
OPEN-SOURCE CLOSE-LOOP PANCREAS**

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VIDEO AT  
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**Which systems thinking skills do you use?**

**#1: Explore Multiple Perspectives**

Even though my invention is very useful for me and many others, I understand that my technology is not for everyone, and that some people might not want to have a pump and continuous glucose monitor on their body.

**#12: Characterize Feedback Loops**

The continuous glucose monitor, insulin pump, and APS computer work together as a feedback loop because the output of glucose level data affects the input of insulin into the body. I must understand this cycle and its complexities such as time delays to create a functional Artificial Pancreas System.

**#14: Predict Future System Behavior**

I have to think about how my idea may grow, and how to scale up my invention.

**1. What is your role within the STEM community?**

I am an independent researcher, the creator of the “Do It Yourself” pancreas system, founder of the open source artificial pancreas system (OpenAPS) movement and an advocate of patient centered research.

**2. What complex problem do you address in your work?**

The OpenAPS technology helps people with Type 1 diabetes. People with diabetes cannot produce enough insulin, so they have to put it into their bodies to survive. Glucose levels affect how much insulin needs to be administered, but it fluctuates throughout the day. My invention includes using a glucose monitor that can tell when glucose levels are low, an insulin pump to administer insulin, and an algorithm running on a small computer to connect the two. After I saw how well it worked for myself, I made it open source so that others could use it, too. Now, around 3,000 people worldwide are using a do-it-yourself automated insulin delivery system of some kind. This technology takes away a lot of the daily burdens of diabetes.

**3. What elements do you need to consider when addressing this problem?**

My biggest challenge now is scaling up my technology and making the system as accessible as possible for others to use. The OpenAPS project is not an organization, but a group of people with Type 1 diabetes who are working to create hardware and software to make life with Type 1 diabetes better. This means there are many people working with me. Sometimes it is difficult for me to get my collaborators to use systems thinking and take the long term into account.

**4. How did you get to where you are today?**

I was just beginning to explore career paths as a high school freshman when I was diagnosed with Type 1 diabetes; this event completely changed my path. I am now the founder of the OpenAPS project.

**5. What advice do you have for becoming a systems thinker?**

I advise high school students who are interested in independent development and open source technology to have a strong foundational knowledge of the subject at hand, to have good verbal and online communication skills, and to use the scientific method.