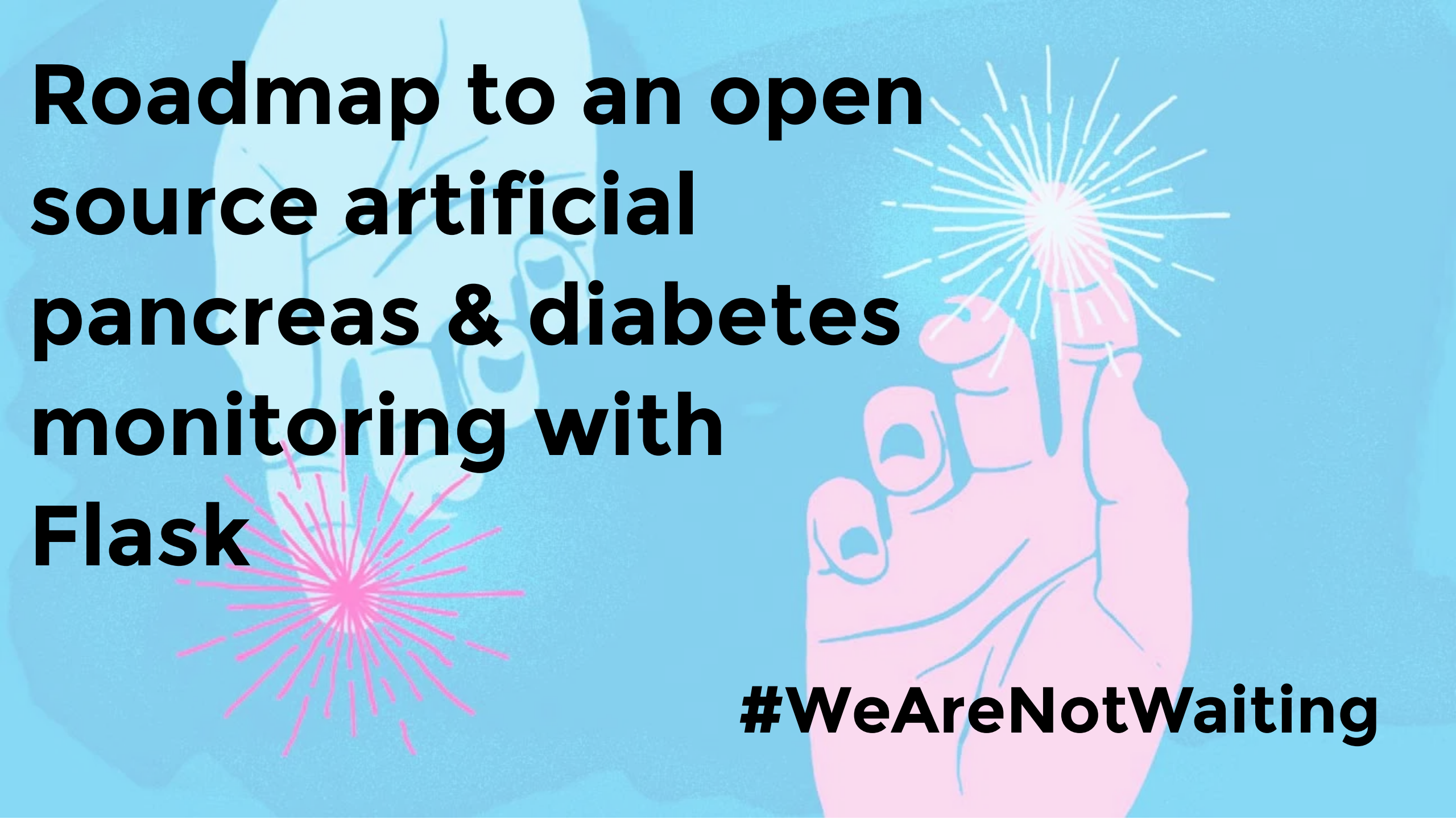
Roadmap to an open source artificial pancreas & diabetes monitoring with Flask



#WeAreNotWaiting

$whoami

Diana Rodríguez

Google Developer Expert

Auth0 Ambassador

Microsoft MVP

🐍 Developer Advocate @ **Vonage**

GDG Durham Organiser @ **gdgdurham**

🦊 **https://gdgdurham.org**

🦪 **@cotufa82 | https://superdi.dev**

DIABETES

@cotufa82

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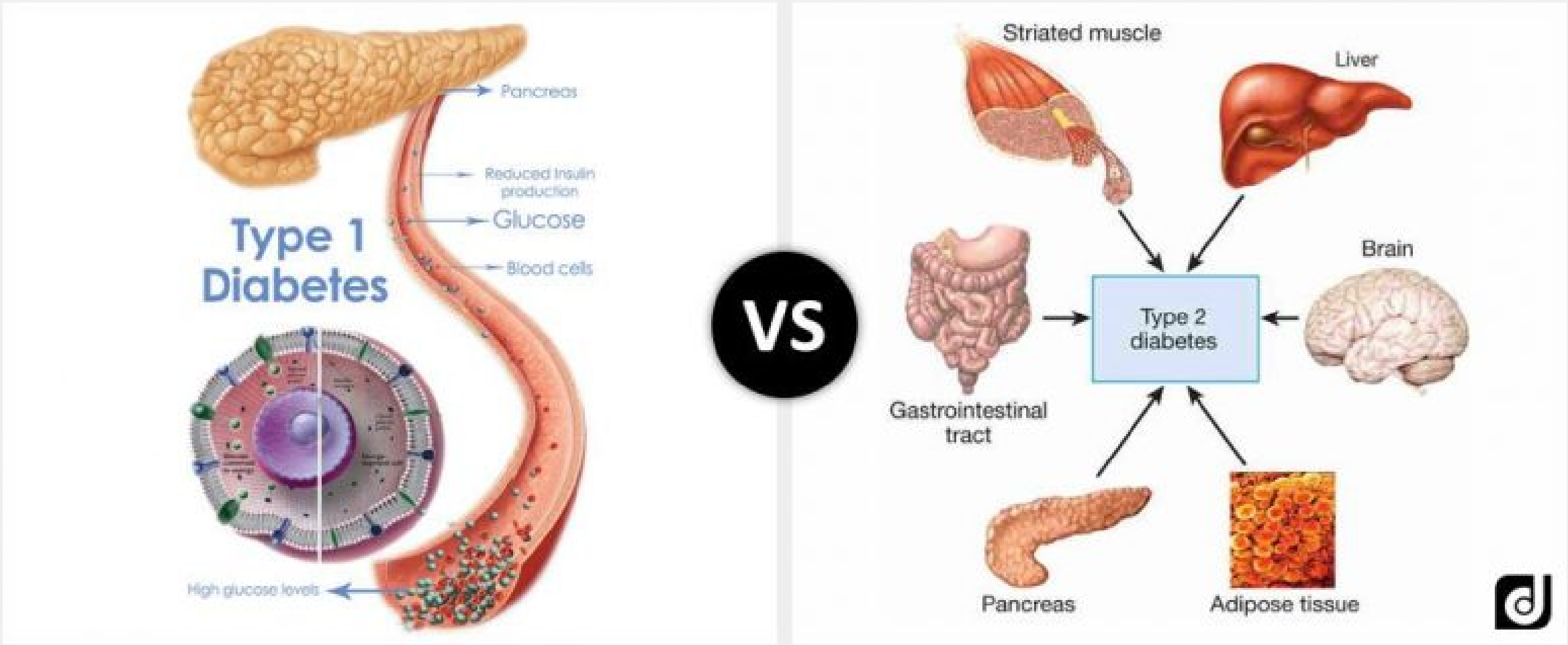
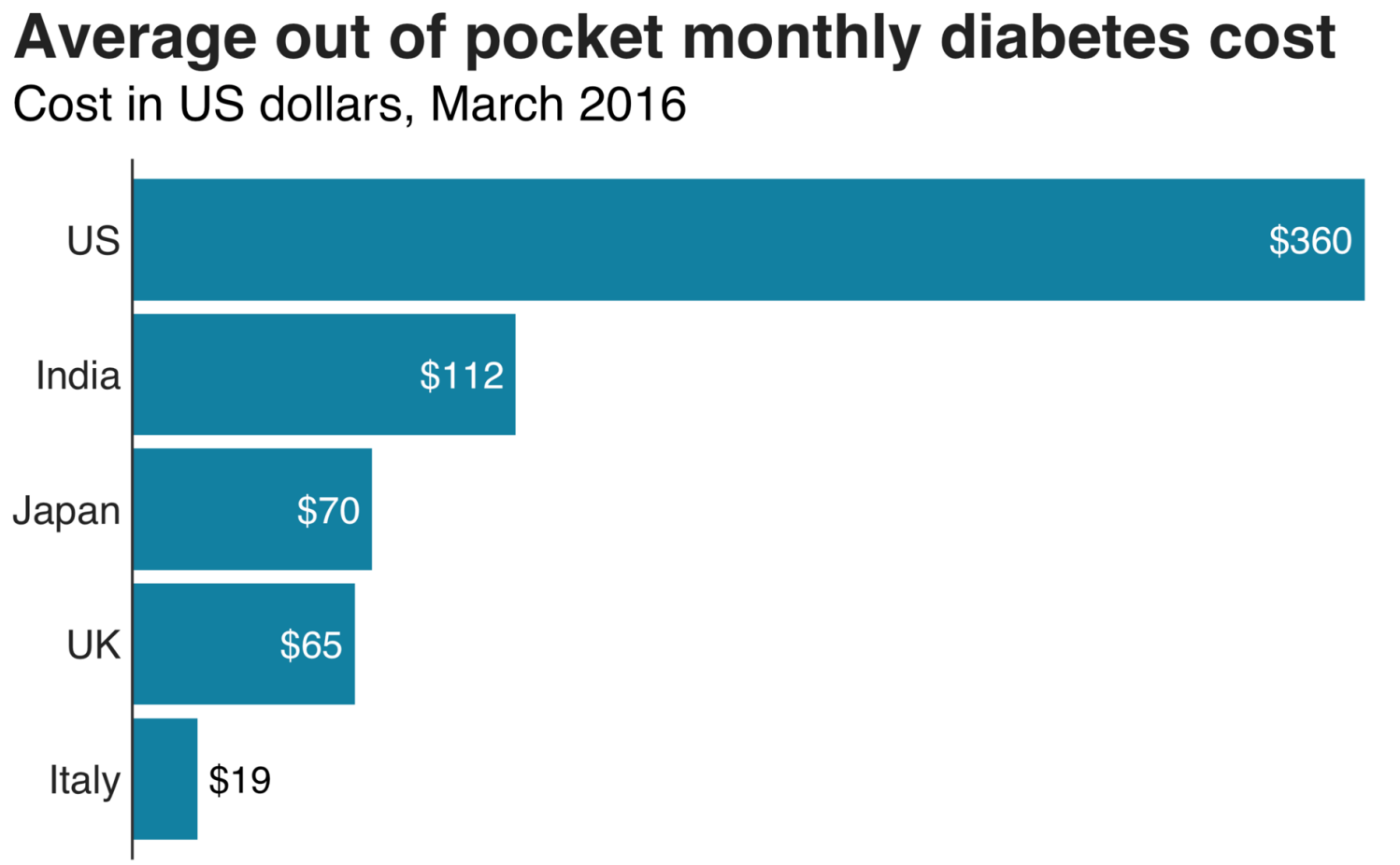
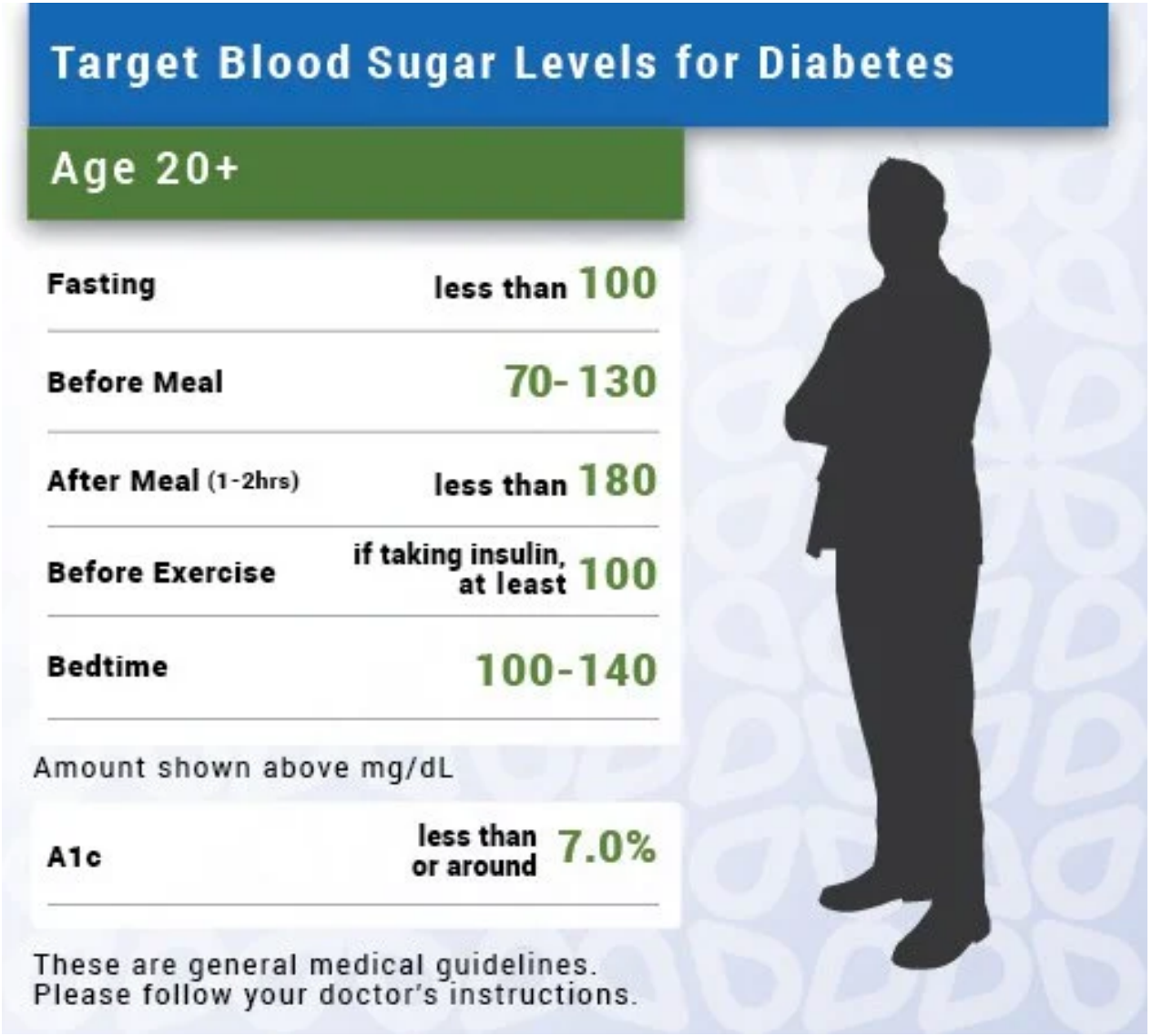


Type 1 Diabetes vs. Type 2 Diabetes

WHY ALL THIS FUSS?



RUNNING AN AUTOMATED PROCESS MANUALLY WITH THESE GUIDELINES




TOO MUCH
NOT ENOUGH

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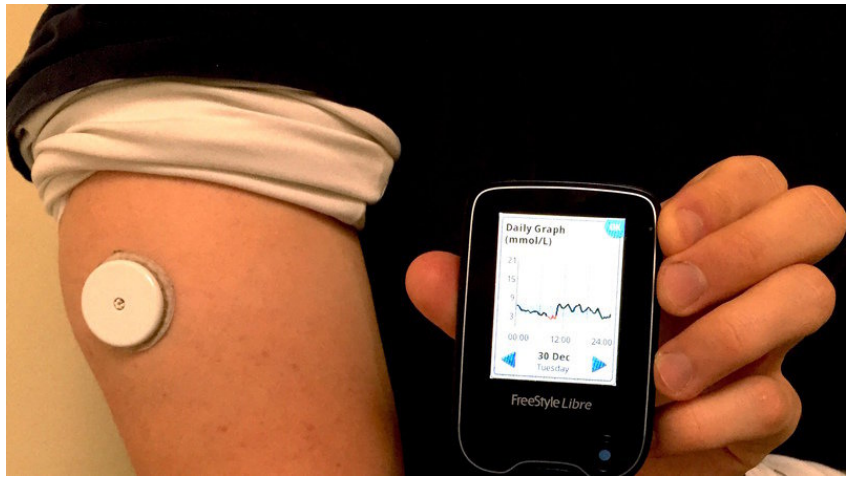
HOW? MORE CONTEXT PLEASE....?


Daily Graph
(mmol/L)
00:00
12:00
24:00
30 Dec
Tuesday
FreeStyle Libre


5.1
Bolus
Basal

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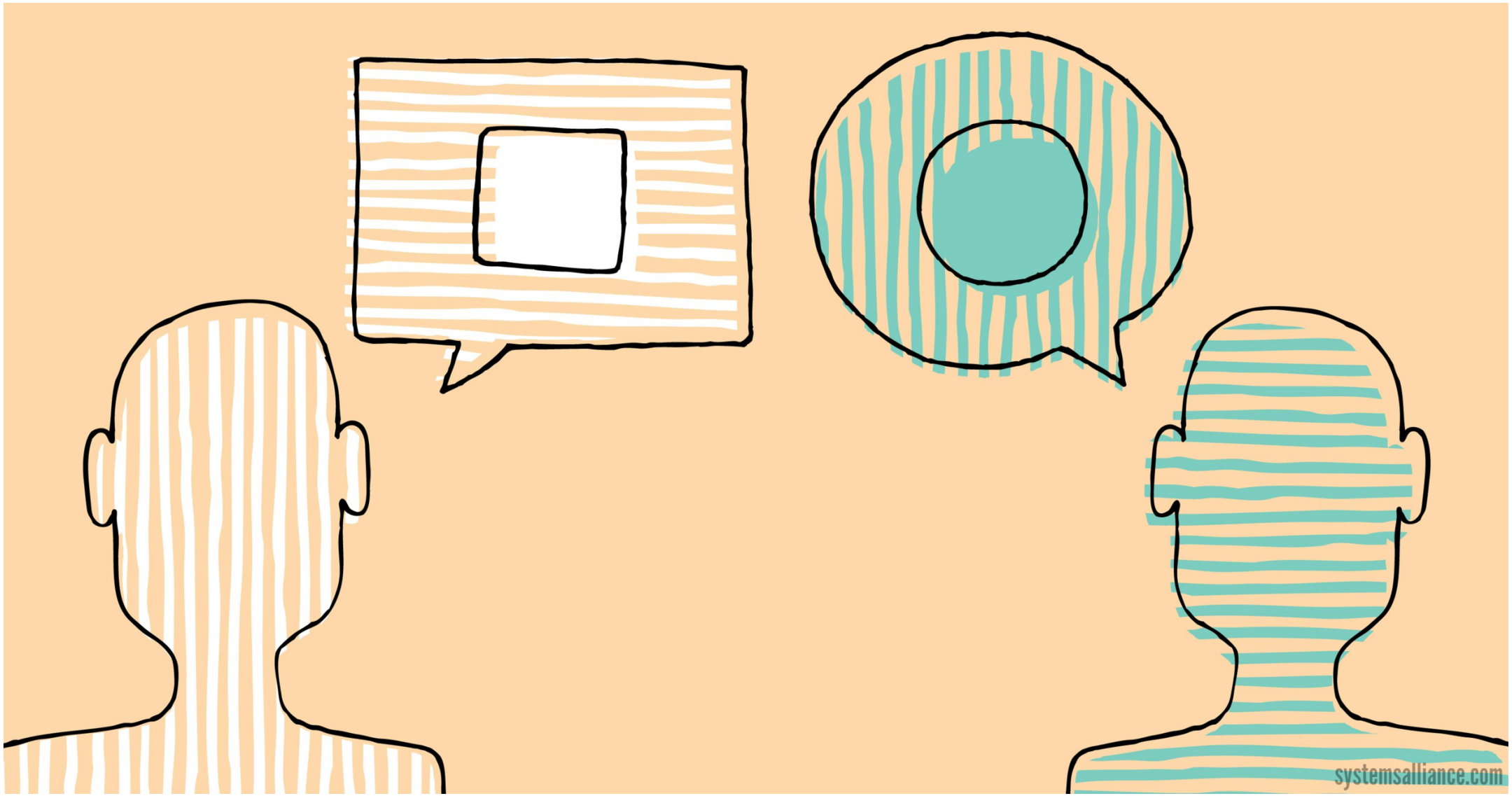

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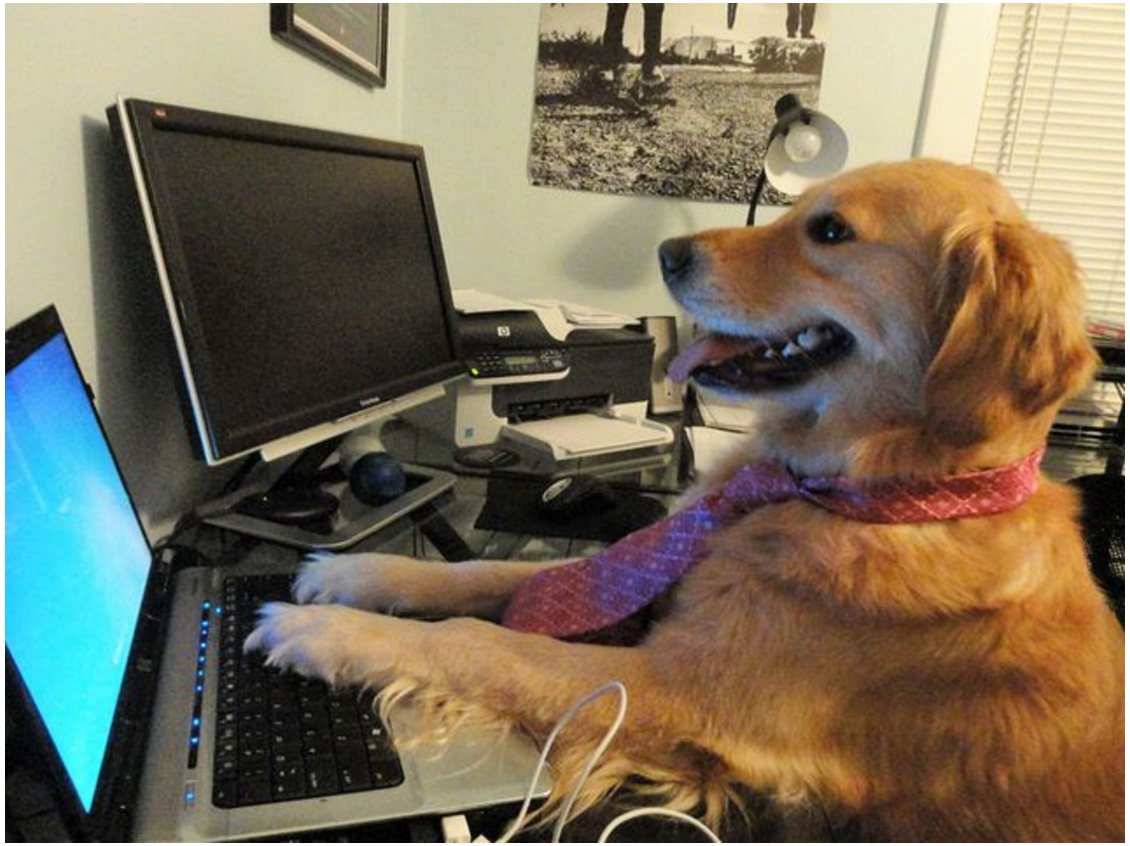

USING TECH FOR GOOD CAUSES

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1. Monitoring

NIGHTSCOUT

#WeAreNotWaiting

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NIGHTSCOUT
#WeAreNotWaiting

- Web-based CGM (Continuous Glucose Monitor)

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NIGHTSCOUT

#WeAreNotWaiting

- Web-based CGM (Continuous Glucose Monitor)
- Glucose data in real time! - Values are predicted 30 minutes ahead using an autoregressive second order model.

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NIGHTSCOUT

#WeAreNotWaiting

- Web-based CGM (Continuous Glucose Monitor)
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- Server reads a mongoDB containing data from your sensor

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NIGHTSCOUT

#WeAreNotWaiting

- Web-based CGM (Continuous Glucose Monitor)
- Glucose data in real time! - Values are predicted 30 minutes ahead using an autoregressive second order model.
- Server reads a mongoDB containing data from your sensor
- Alarms are generated for high and low values

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NIGHTSCOUT

#WeAreNotWaiting

- Web-based CGM (Continuous Glucose Monitor)
- Glucose data in real time! - Values are predicted 30 minutes ahead using an autoregressive second order model.
- Server reads a mongoDB containing data from your sensor
- Alarms are generated for high and low values
- FOSS!!

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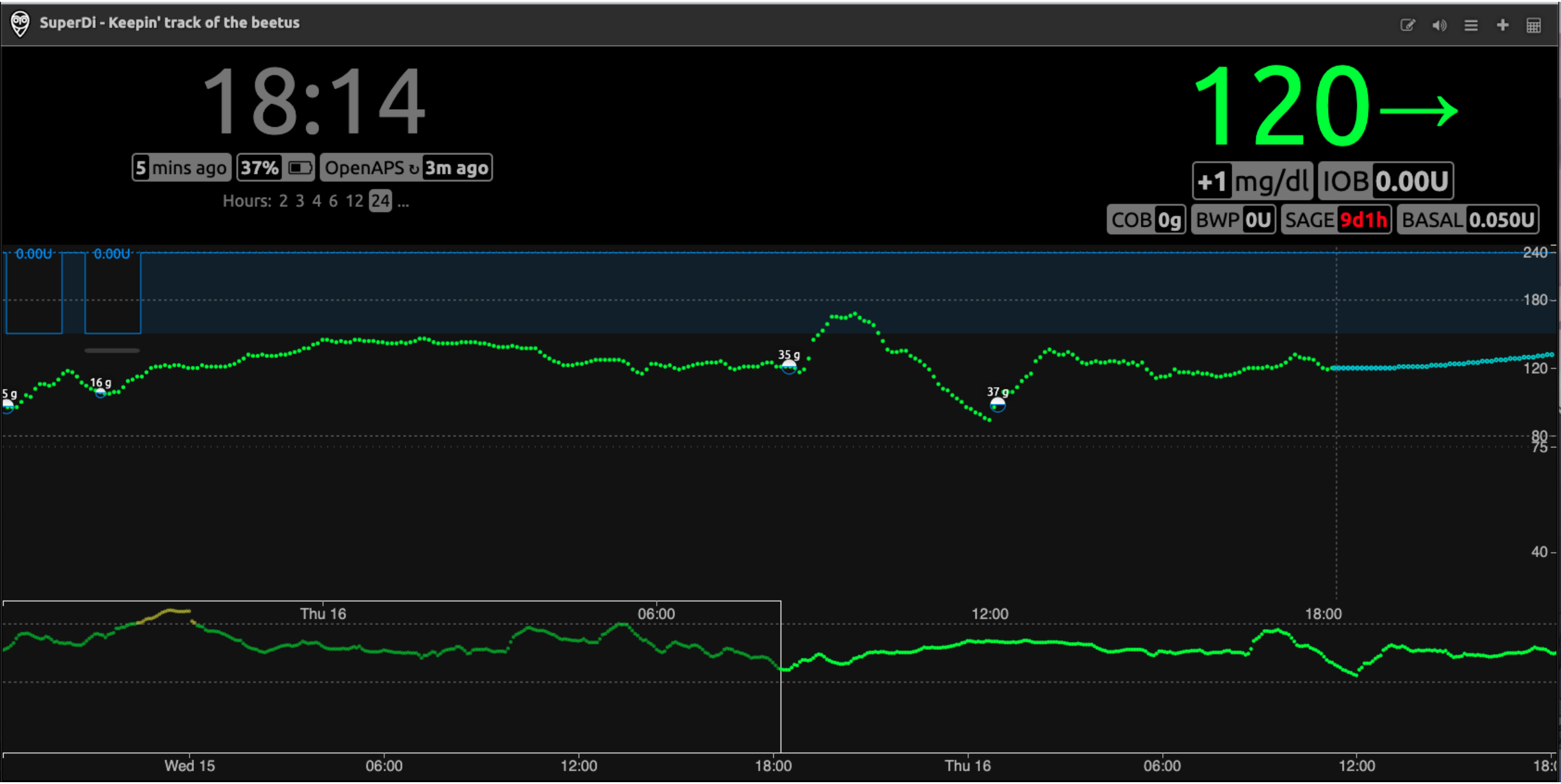
CONTEXT

https://dianux.superdi.dev


SuperDi - Keepin' track of the beetus
18:14
5 mins ago
37%
OpenAPS 3m ago
Hours: 2 3 4 6 12 24 ...
120→
+1 mg/dl
IOB 0.00U
COB 0g
BWP 0U
SAGE 9d1h
BASAL 0.050U
0.00U
0.00U
240
180
120
80
75
40
5 g
16 g
35 g
37 g
Thu 16
06:00
12:00
18:00
Wed 15
06:00
12:00
18:00
Thu 16
06:00
12:00
18:

2. Automating

OpenAPS
(Open Artificial Pancreas System)

The Open Source Artificial Pancreas System (OpenAPS) is a safe but powerful, advanced but easily understandable, Artificial Pancreas System (APS) designed to automatically adjust an insulin pump's insulin delivery to keep blood glucose (BG) in a safe range at all times. It does this by communicating with an insulin pump to obtain details of all recent insulin dosing (basal and boluses), by communicating with a Continuous Glucose Monitor (CGM) to obtain current and recent BG estimates, and by issuing commands to the insulin pump to adjust insulin dosing as needed

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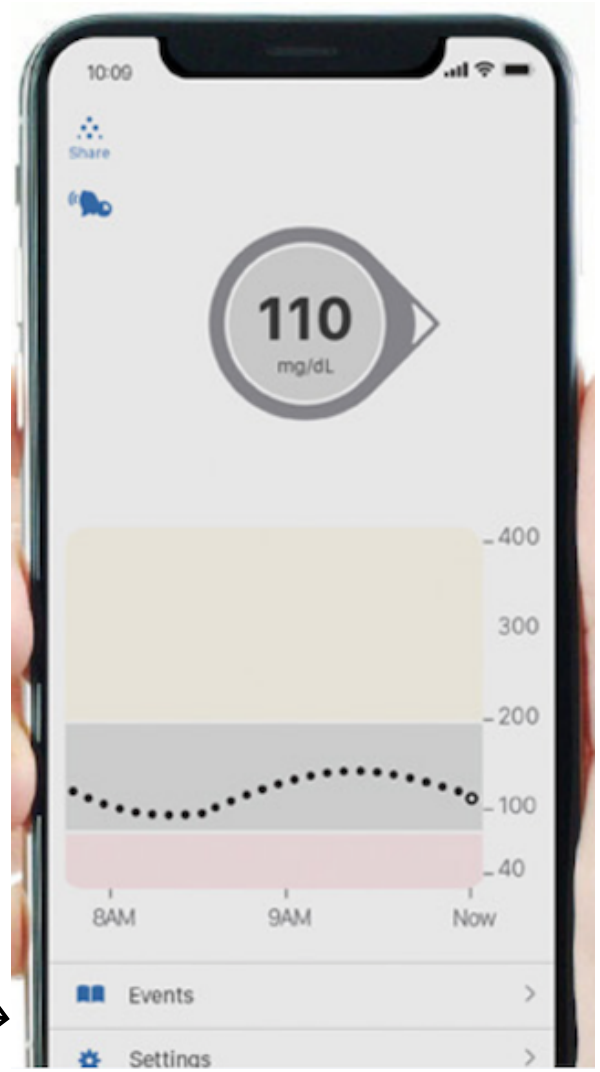
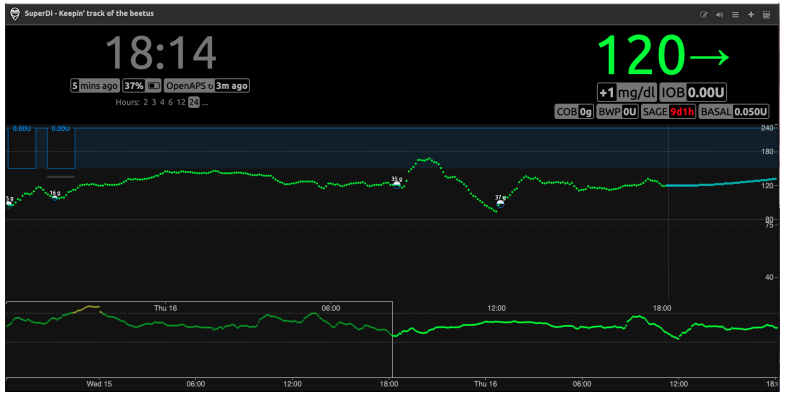
"As of July 13, 2020, there are more than (n=1)*1,957+ individuals around the world with various types of DIY closed loop implementations (that we know of). This number continues to grow, as does the number of options for various types of DIY closed loops!"

OpenAPS


10:09
Share
110
mg/dL
400
300
200
100
40
8AM
9AM
Now
Events
Settings


10:09
Share
110
mg/dL
400
300
200
100
40
8AM
9AM
Now
Events
Settings


10:09
Share
110
mg/dL
400
300
200
100
40
8AM
9AM
Now
Events
Settings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37%
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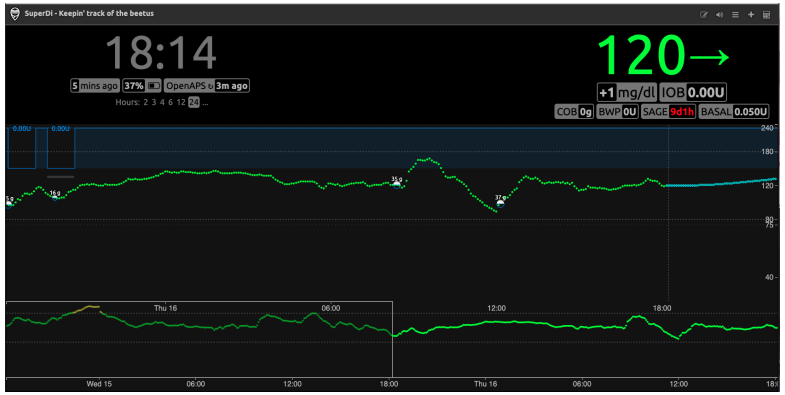
COB 0g
BWP 0U
SAGE 9d1h
BASAL 0.050U
Wed 15
06:00
12:00
18:00
Thu 16


10:09
Share
110
mg/dL
400
300
200
100
40
8AM
9AM
Now
Events
Settings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18:14
120→
+1 mg/dl IOB 0.00U
COB 0g BWP 0U SAGE 9d1h BASAL 0.050U
Thu 16
Wed 15
Thu 16

My (your) Contribution

FLASK IN ACTION

https://nexmo-scout.appspot.com/

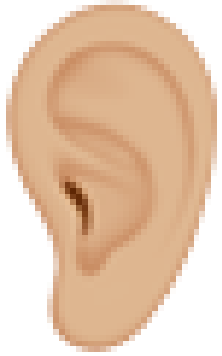
https://github.com/nexmo-community/nexmo-scout


High Glucose Alert
202
mg/dL
OK


Urgent Low Glucose Alert
51
mg/dL
OK


High Glucose Alert
202
mg/dL
OK


Urgent Low Glucose Alert
51
mg/dL
OK




High Glucose Alert
202
mg/dL
OK


Urgent Low Glucose Alert
51
mg/dL
OK


High Glucose Alert
202
mg/dL
OK


Urgent Low Glucose Alert
51
mg/dL
OK

HOW?

3.9 mmol/L

or

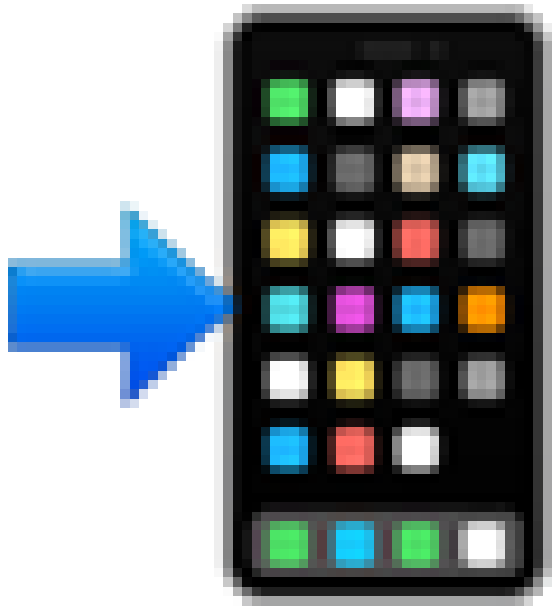
70 mg/dl

3.9 mmol/L
or
70 mg/dl

10 mmol/L
or
180 mg/dl

3.9 mmol/L
or
70 mg/dl

🚨⬇️🚨



10 mmol/L
or
180 mg/dl

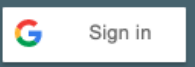
🚨⬆️🚨

Scout = Nexmo + Nightscout

Welcome guest, You need to authenticate

Login To Enter Scout

This application will help you configure alerts to your mobile phone, a preferred emergency contact and up to 5 additional contacts. If you have a Nightscout dashboard and your api is enabled for external queries, you can use this application. When your glucose levels are out of range, you will receive an alert call on your mobile as well as and your preferred. If you do not answer the call then a sms is sent to your emergency contact(s).



Scout = Nexmo + Nightscout

you are logged in as **Super Diana** - Logout

Your Scout Profile

Enter NightScout Api Entries Url (Entries url finish with **entries.json**)

https://dianux.superdi.dev/api/v1/entries.json

Enter your phone number

11234567890

Enter emergency contact number

11234567890

Add up to 5 additional emergency contacts:

SAVE

layout.html

```
1       <head>
2       <link rel="stylesheet" href=
3         "{{ url_for('static', filename='css/materialize.min.css') }}">
4       {% block head %}{% endblock %}
5       </head>
```

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```

login.html

```
1 {% extends "layout.html" %}
2   {% block head %}
3   <script src="https://apis.google.com/js/platform.js" async defer></script>
4   <meta name="google-signin-client_id" content="{{ client_id }}">
5   {% endblock %}
```

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  <meta name="google-signin-client_id" content="{{ client_id }}">
  {% endblock %}
```
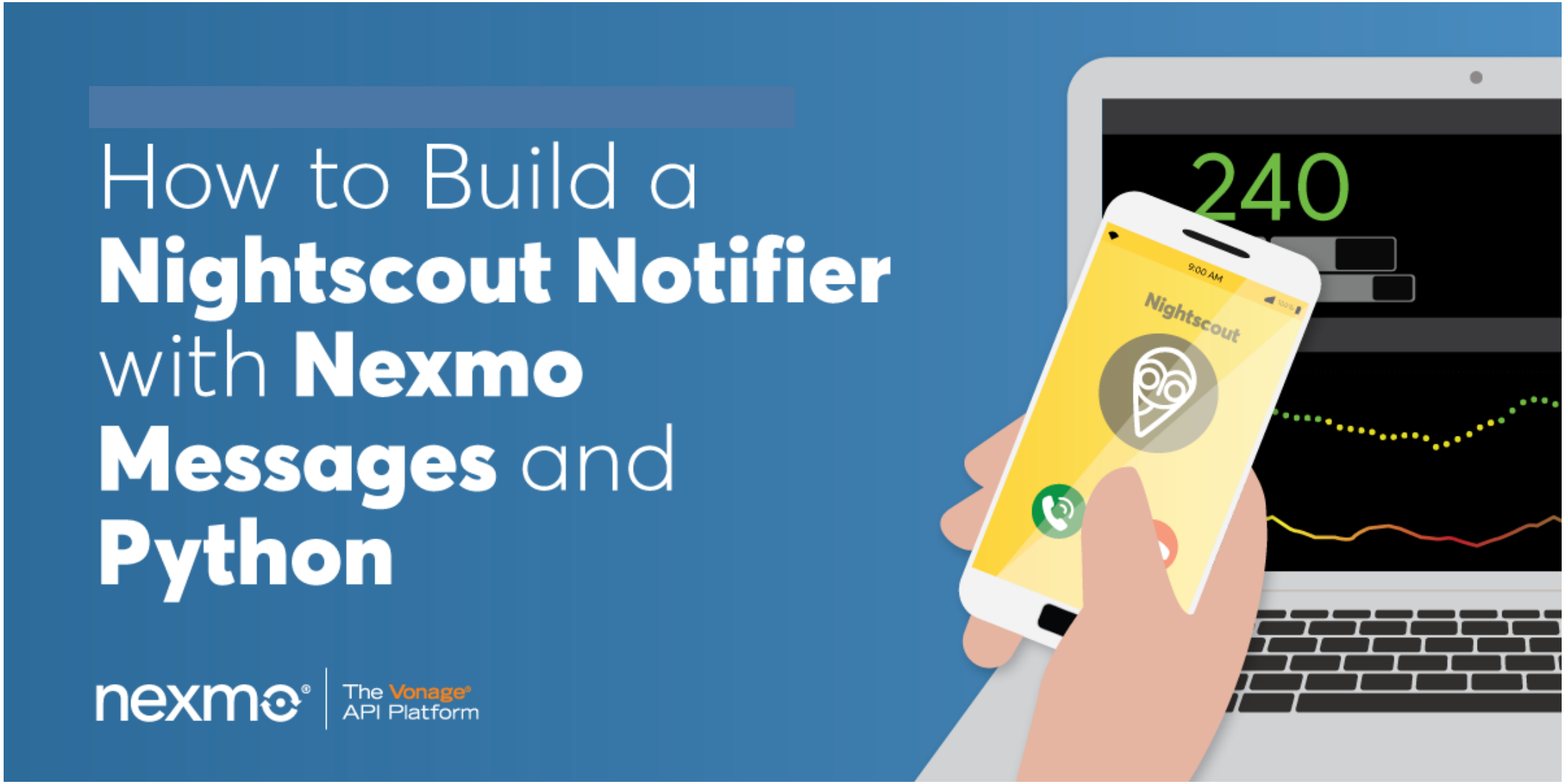

app.py

```
1 @app.route('/login',methods=["POST"])
2 def login():
```



https://nexmo.dev/nightscout

#TECH4GOOD CHALLENGE

https://nexmo.dev/europython2020

$resources

$resources

- Sarah Withee @geekygirlsarah

$resources

- Sarah Withee @geekygirlsarah
- Scott Hanselman @shanselman

$resources

- Sarah Withee @geekygirlsarah
- Scott Hanselman @shanselman
- https://nightscout.info

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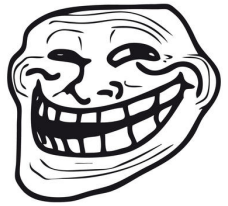

MUCHAS GRACIAS!!

https://superdi.dev

@cotufa82

https://slides.com/superdiana/diabetox