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

#WeAreNotWaiting
$whoami

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Google Developer Expert
Auth0 Ambassador
Microsoft MVP

🐍 Developer Advocate @ Vonage
GDG Durham Organiser @ gdgdurham
🦊 https://gdgdurham.org
🐦 @cotufa82 | https://superdi.dev
DIABETES
Type 1 Diabetes vs. Type 2 Diabetes
WHY ALL THIS FUSS?

Average out of pocket monthly diabetes cost
Cost in US dollars, March 2016

- US: $360
- India: $112
- Japan: $70
- UK: $65
- Italy: $19

Note: Cost includes insulin as well as other diabetic supplies
Source: T1International Insulin & Diabetes Supply Survey
RUNNING AN AUTOMATED PROCESS MANUALLY WITH THESE GUIDELINES

![Image showing blood sugar levels for diabetes]

## Target Blood Sugar Levels for Diabetes

### Age 20+

<table>
<thead>
<tr>
<th>Condition</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fasting</td>
<td>less than 100</td>
</tr>
<tr>
<td>Before Meal</td>
<td>70–130</td>
</tr>
<tr>
<td>After Meal (1-2hrs)</td>
<td>less than 180</td>
</tr>
<tr>
<td>Before Exercise (if taking insulin)</td>
<td>at least 100</td>
</tr>
<tr>
<td>Bedtime</td>
<td>100–140</td>
</tr>
</tbody>
</table>

Amount shown above mg/dL

| A1c                              | less than or around 7.0% |

These are general medical guidelines. Please follow your doctor's instructions.
too much
not enough
HOW? MORE CONTEXT PLEASE....?
USING TECH FOR GOOD CAUSES

@cotufa82
1. Monitoring
• Web-based CGM (Continuous Glucose Monitor)
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• Glucose data in real time! - Values are predicted 30 minutes ahead using an autoregressive second order model.
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- Server reads a mongoDB containing data from your sensor
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- Alarms are generated for high and low values
• 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!!
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.
"As of July 13, 2020, there are more than \((n=1)\times1,957+\) 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
My (your) Contribution
FLASK IN ACTION

https://nexmo-scout.appspot.com/
https://github.com/nexmo-community/nexmo-scout
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 🚨⬆
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 your preferred. If you do not answer the call then a sms is sent to your emergency contact(s).

Sign In
Your Scout Profile

Enter NightScout API Entries URI (Entries uri 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

```html
<head>
<link rel="stylesheet" href="{{ url_for('static', filename='css/materialize.min.css') }}">
{% block head %}{% endblock %}
</head>
```
layout.html

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{% extends "layout.html" %}
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<script src="https://apis.google.com/js/platform.js" async defer></script>
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{% endblock %}
```python
@app.route('/login', methods=['POST'])
def login():
```
How to Build a Nightscout Notifier with Nexmo Messages and Python

https://nexmo.dev/nightscout
#TECH4GOOD CHALLENGE

ARE YOU UP FOR THE CHALLENGE?

https://nexmo.dev/europython2020
$resources
$resources

- Sarah Withee @geekygirlsarah
$resources

- Sarah Withee @geekygirsarah
- Scott Hanselman @shanselman
$resources

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MUCHAS GRACIAS!!

https://superdi.dev
@cotufa82

https://slides.com/superdiana/diabetox