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D1NAMO NTF

FNSNF

The D1NAMO platform architecture

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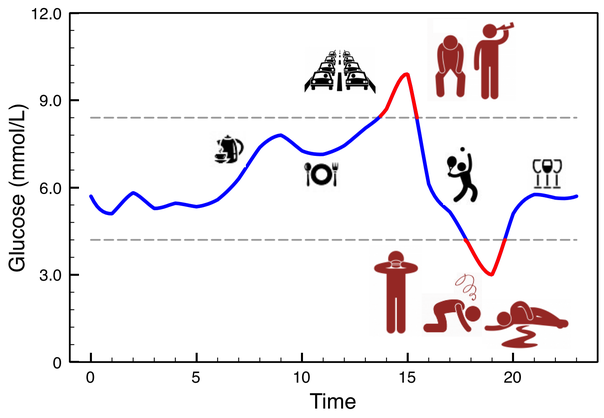
Problematic

Diabetes type 1 is an autoimmune disease that affects the insulin level of a patient.

Once a patient is affected by diabetes type 1, the only possible treatment is insulin shots several time a day to keep the insulin level under control and keep the risk of hypoglycaemia low. Unfortunately, intensively controlled glycaemia levels allows patients to have a better outcome from the perspective of microvascular and macrovascular complications of diabetes type 1, meaning that there exist a trade-off between limiting the amounts of hypoglycaemias of the patient and limiting the occurrence of cardiovascular diseases later in the patient life.

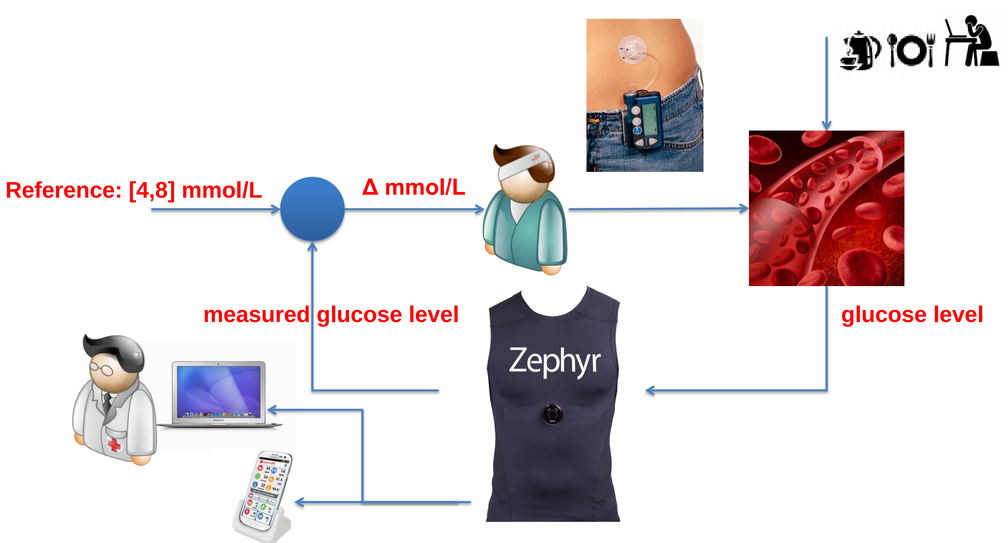


Consequently, understanding the physiological counter-regulatory responses caused by hypoglycaemia with respect to the usage of insulin would allow to improve the management of hypoglycaemic episodes. Also observing the physiological values of patient before, during and after occurrences of hypoglycaemia would permit to have a better understanding of the phenomenon as well as to allow a non-invasive prediction of hypoglycaemic episodes. Furthermore, being able to predict hypoglycaemia given the level of activity of the patient during the day and the week would allow doctors to act pre-emptively toward the hypoglycaemias.

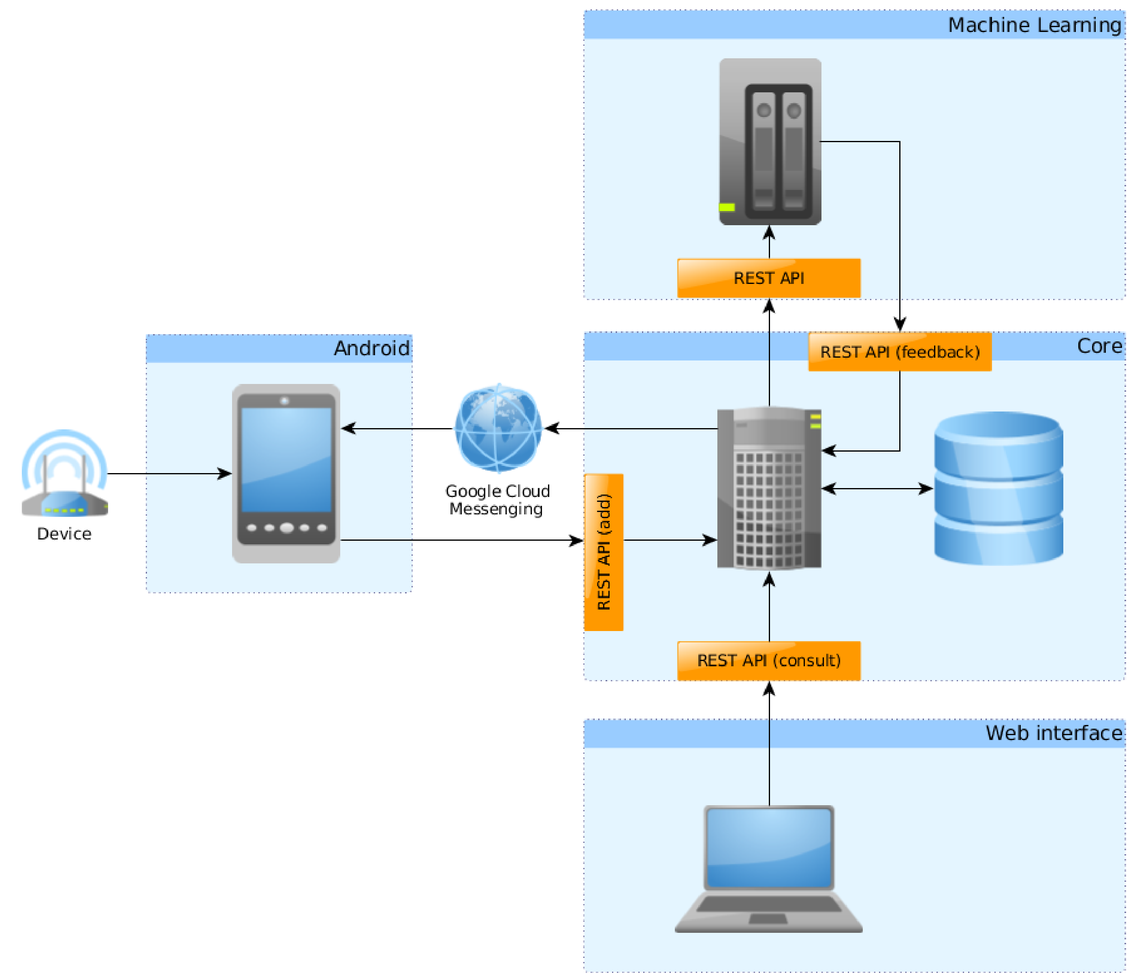
Proposed solution

The D1NAMO project aims to develop a pervasive personal-sensing application for patients with diabetes type 1 that will make use of advanced wearable devices to monitor the physiological data of the patient such as heart rate, ECG and breathing rate. This would allow to:

- Monitor the activity of the patient.
- Provide informative feedback to the patient and the doctor about the physical activities performed and their impact on diet and medication.
- Detecting symptoms of hypoglycaemic attacks in order to provide early alerts to the doctors.



Platform architecture



Components:

The platform is composed of several modules:

- The physiological sensor. In D1NAMO it is the Zephyr BioHarness 3.
- An Android application, responsible to communicate with the sensor by Bluetooth, and to temporary store the data.
- A core server, gathering data from patients' phone into a database. It is also providing an API for accessing these data.
- A database, only accessible by the server.
- A web interface allowing the medical staff to consult and query patient's data.
- A machine learning module to analyze patients' data and trigger alerts.

Advantages of the architecture:

The communications are done through REST API, offering some advantages:

- The modules can be written with different technologies
- The modules can eventually be reused for other projects,
- It will be easy to replace deprecated modules by new ones speaking with the same API.
- It would be simpler to scale the platform if needed.
- Modules can be split across different servers.