**Requirement Gathering 4th Prototype**

**Group:** Proyecto de Programacia

* **Data Collection**

*(1) As a [User/Administrator], I want to collect [Baby Hospital Number] so that [these could be used as valuable research resources and related to baby demographics in the future.]*

*(2) As a [User/Administrator], I want to collect [Glucose Concentration Data] so that [it could be used for real-time monitoring of baby’s health status.]*

*(3) As a [User/Administrator], I want to collect [Skin Glucose Current Data] so that [it could also be used for real-time monitoring after calibration.]*

*(4) As a [User/Administrator], I want to collect [Calibration Parameters] so that [the concentration curve could be adjusted and plotted more accurately.]*

*(5) As a [User/Administrator], I want to collect [Lag Time] so that [graphs could be correctly plotted and presented accurately.]*

Note:

(1) Glucose Concentration Data: Glucose Concentration Data: discrete concentration value entered by User/Administrator

(2) Skin Glucose Current Data: discrete signal value directly from the sensor

(3) Skin Glucose Concentration Data: discrete concentration value calculated by calibrating Skin Glucose Current Data

(3) Timestamp: in the format 'date/hour/minute/second'. The timestamp is set as default to the time of entering, but should include the possibility of applying a correction factor (e.g. 1/5/10 minutes ago) in case log was not immediate after measurement.

(4) Event: Free text comment which illustrate the action performed at certain time point, every event information is time stamped.

(6) Lag Time: the time between sample leaving the body and analyzed by the sensor. This is set to 10min as default but could be changed with the administration priority

* **Data Processing**

*(1) As a [User/Administrator], I want to [calibrate the signal data] so that [signals in the current/voltage form could be transformed into concentration, which makes it easily to be understood and could be used for clinical analysis directly.]*

*(2) As a [User/Administrator], I want to [perform post processing] so that [the graph could be plotted more clearly and the hidden trend within the time series could be found more easily.]*

Note:

For post signal processing, we could apply these operations:

(1) Stationary Detection: The Autocorrelation (ACF) could be plotted and normally a stationary time series would have a short-term correlations

(2) Drift Removement and Denoising: Drift could be removed by differentiation, fitting regression models or applying nonlinear transformations (log...). Noise could be removed by applying Moving Average Filter, Savitski Golay Filter, Exponential Smoothing Filter, Linear Fourier Smoothing or Nonlinear Wavelet shrinkage.

(3) Model Fitting: the time series might be fit into several models like White Noise Model, Autoregressive(AR) Model, Random Walk Model, Moving Average(MA) Model or Autoregressive Moving Average(ARMA) Model for researching purpose.

* **Data Plotting**

*(1) As a [User/Administrator], I want to plot [Glucose Concentration with respect to Time] so that [the long-term trend of the glucose concentration could be presented, and any unusual variation could be detected with the matching time information.]*

*(2) As a [User/Administrator], I want to plot [Skin Glucose Concentration with respect to Time] so that [the long-term trend of the skin glucose concentration could be presented, and any unusual variation could be detected with the matching time information.]*

*(3) As a [User/Administrator], I want to plot [Event with respect to Time (in the same plots as (1) & (2))] so that [it shares the same time axis with the concentration plots such that all of them could be looked at together and the trend in the plot might be more reasonably explained.]*

*(4) As a [User/Administrator], I want to plot [Skin Glucose Concentration with respect to Glucose Concentration] so that [the correlation between these 2 concentrations could be evaluated for more accurate device validation.]*

*(5) As a [User/Administrator], I want to plot [Bland-Altman Plot for Glucose Concentration and Skin Glucose Concentration] so that [the agreement between these paired measurements could be determined and used in device validation.]*

Note:

(1) The Bland Altman Plot requires calibration using the slope and the intercept from the plot 4. So, when we get a disagreement conclusion, we could confirm that the device could not give a valid reading and this is not affected by the measurement error of the sensor.

* **Permission Control**

*(1) As a [User/Administrator], I could [log in using a unique ID and a matched password] so that [only users given permission could use this app.]*

*(2) As a [User/Administrator], I could [change my password] so that [I could have more safety protection for my account.]*

*(3) As an [Administrator], I could [change other User’s password (User only)] so that [I could manage the organization and help User in case they forget the password.]*

*(4) As a [User/Administrator], I could [add Blood Glucose Measurement Information with Timestamp and User ID (stored for data transparency, but not displayed)] so that [it could be compared against skin glucose measurements.]*

*(5) As a [User/Administrator], I could [add Event Information with Timestamp and User ID (stored for data transparency, but not displayed)] so that [it could be analyzed with concentration data and might be able to explain some unusual trends in the plot.]*

*(6) As a [User/Administrator], I could [correct the input data made by my ID within a certain time interval (5min) (and reflect such change in a change log)] so that [any errors could be corrected while the database is under protected.]*

*(7) As a [User/Administrator], I could [check the detailed description of event or concentration at certain time point] by [typing in a specific time or clicking on the time graph] so that [I could understand more details with higher accuracy.]*

*(8) As an [Administrator], I could [correct any input data made by any User ID with no time limit (and reflect such change in a change log)] so that [the data stored in the database is well organized and remains accurate.]*

*(9) As an [Administrator], I could [change the Calibration Setting] so that [a more accurate prediction could be achieved from the modified calibration curve.]*

*(10) As an [Administrator], I could [add/delete other User’s account] so that [I could manage the organization.]*

*(11) As an [Administrator], I could [check and manage the log file] so that [any operations done to the database could be recorded and well managed.]*

Note:

(1) This application will require User to enter the Calibration Setting the first time it is used. After that, this setting is set as default for further use and could be changed by Administrator later