# I read the paper: A Review of Emerging Technologies for the Management of Diabetes Mellitus

**Goal:**

* The aim of this paper is to present and discuss the latest accomplishments in sensors for glucose and lifestyle monitoring to facilitate self-disease management and support healthcare professionals in decision making.

**What have been done:**

* A critical literature review analysis is conducted focusing on advances in:
* Sensors for physiological and lifestyle monitoring as well as modeling and control methods for regulating glucose levels

**How it is done:**

Sensors for Glucose and Lifestyle Monitoring:

* Abbott developed Freestyle Libre that can take glucose readings as many times a day as needed through a patch worn on the back of the upper arm and does not require finger-prick calibration
* MediWise's Glucowise is a pain free glucose sensor that squeezes the skin between the thumb and the forefinger and displays the reading in real time on the screen
* The CGMS are usually integrated with insulin infusion pumps. The latest technology insulin pumps come with the bolus wizard feature, which provides suggestions of the premeal insulin boluses taking into account the current blood glucose record, the carb-insulin ratio and other information such as insulin sensitivity
* On-body sensors such as pedometers (measure footsteps), accelerometers (measure acceleration along a given axis), and heart rate monitors are used to detect and quantify physical activity. These devices can compute indirectly the energy expenditure based on their records (number of steps, movements, heart rate) and their accuracy depends on the kind of the activity and the sensor type.
  + - Devices such as Garmin Vivofit 2, Jawbone Up 24, Fitbit Flex, Basis Peak, BodyMedia LINK Armband, and Withings Pulse O2 incorporate multiple sensors, which are worn on the arm and are able to track steps, movement, sleep, and calories burned.

### Models for T2DM Risk Prediction and Early Diagnosis

* Primary prevention of T2DM aims at preventing the onset of the disease via reducing the risk of an individual to develop T2DM, while secondary prevention focuses on the early detection of the disease and optimization of diabetes treatment plan in order to control disease progression.
* The most commonly identified risk predictors, which have been found as strongly correlated with the onset of T2DM are: age, family history of diabetes, body mass index, hypertension, waist circumference, ethnicity, fasting glucose level, glycosylated hemoglobin, lipids, uric acid, or γ-glutamyltransferases, smoking status, and physical activity
* In the prediction of T2DM-related symptoms, a rule indicates that, if a set of observed health-related events *X* has occurred in the past Tx time period, then another set of T2DM or indicators *Y* has a possibility *p* to occur in the following Ty time span.

Results:

* Glucose and lifestyle sensing technologies are continuously evolving with current research focusing on the development of non-invasive sensors for accurate glucose monitoring.
* A wide range of modeling, classification, clustering, and control approaches have been deployed for the development of the CDSS for diabetes management.

Conclusion:

* Integration of data originating from sensor-based systems and electronic health records combined with smart data analytics methods and powerful user centered approaches enable the shift toward preventive, predictive, personalized, and participatory diabetes care.

**Useful Applications to Use in Our Project:**

***SocialDiabetes*⃝R**

Social Diabetes is an easy-to-use, multi-award-winning di- abetes self-management system for type-1 and type-2 diabetes patients that can be accessed from any browser, as well as via dedicated apps for iPhone and Android devices. Social Diabetes contains a list of 11,000+ foods and their nutritional properties, derived from international databases as well as user- generated food information and also provides a hypoglycaemia prediction system (based on the specific patients behaviour) which offers immediate feedback for insulin adjustment.

***Oviva*⃝R**

Oviva Dietetics offers a unique diabetic patient treatment model through its client relationship management system, which consists of a patient-facing app. for conveniently logging dietary intake, activity and weight, a secure text message chan- nel to a dietitian, and a cloud based dietitian electronic medical record where inputs are reviewed and tailored feedback is provided to the user. Oviva’s initial outcome data for weight management patients shows a doubling of weight lost per unit of dietitian time compared to standard face to face care (5.7% vs. 2.9% body weight loss at 3 months in 83 patients with diabetes, cardiovascular disease & obesity referred for weight loss).