

## Carbohydrate Intake Estimation in Type I Diabetic Patients Described by UVA/Padova Model

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**Abstract :** In recent years, closed loop control strategies have been developed in order to establish a healthy glucose profile in type 1 diabetic mellitus (T1DM) patients. However, the controller itself is unable to define a suitable reference trajectory for glucose. In this paper, a control strategy is proposed where the shape of the reference trajectory is generated based on the amount of carbohydrates present during the digestive process, due to the effect of carbohydrate intake. Since there does not exist a sensor to measure the amount of carbohydrates consumed, an estimator is proposed. Thus this paper presents the entire process of designing a carbohydrate estimator, which allows estimate disturbance for a predictive controller (MPC) in a T1DM patient, the estimation will be used to establish a profile of reference and improve the response of the controller by providing the estimated information of ingested carbohydrates. The dynamics of the diabetic model used are due to the equations described by the UVA/Padova model of the T1DMS simulator, the system was developed and simulated in Simulink, taking into account the noise and limitations of the glucose control system actuators.

**Keywords :** estimation, glucose control, predictive controller, MPC, UVA/Padova

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