INTRODUCTION

The normal blood glucose concentration level in human is in the range of 70-110 mg/dl. This concentration is normally controlled within these limits by different factors in the body. The most important regulator of the glucose level is insulin.

Diabetes mellitus is a disease in glucose-insulin endocrine metabolic system, in which the pancreas either does not release insulin or does not properly use insulin to uptake glucose in the plasma, which is referred as hyperglycemia.

There are two types of Diabetes type I type II, In this work we Design of FPGA-based Digital PID Controller Using Xilinx SysGen® For Regulating Blood Glucose Level of Type-I Diabetic Patients. In Type I diabetes the body's immune system destroys pancreatic beta cells, and the patient is totally dependent on an external source of insulin to be infused at an appropriate rate to maintain the blood glucose concentration. Control strategies of diabetes treatment can be categorized as open loop control, semi closed-loop, and closed-loop control

closed-loop device capable of maintaining normoglycemia over extended periods of time. A device of this type would contain three major components: i) a mechanical pump; ii) an in vivo glucose sensor; and iii) a mathematical algorithm to regulate the pump given a sensor measurement. Many ways To control a plant of closed loop.

in this work, designing a Digital PID controller for controlling blood Glucose.

In this work some theoretical analysis of the control of blood glucose levels in diabetic individuals is undertaken using a simple mathematical model of the dynamics of glucose and insulin interaction in the blood system developed by Bergman.
The model we study is the so-called "minimal model" of Bergman The model has the minimum number of parameters. While still classified as a very simple model of the dynamics of the interaction of blood glucose and insulin this model still retains some compatibility with known physiological facts and has now been validated in a number of clinical studies. The model consists of three differential equations.

We use the Algorithm PSO (particle swarm optimization) to find optimal solution of PID controller. For designing an optimal Digital PID controller we use a System Generator

System Generator is a system-level modeling tool that simplifies FPGA hardware design. By using this tool the designer with a little knowledge about FPGA hardware and Hardware Description Language (HDL) can develops Simulink in many ways to provide a modeling environment that is appropriated to hardware design.