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Nota di contenuto	Introduction -- Glucose Metabolism and Diabetes -- Literature Review -- Design of an Implantable Artificial Pancreas -- Model Predictive Controller using Interior Point and Ant Algorithm -- In Vivo Experiment of the Implantable Artificial Pancreas -- Parameter Estimation for Nonlinear Mathematical Model -- Conclusion and Future Work.
Sommario/riassunto	The thesis focuses on the control of blood glucose devices and design of implantable devices, and offers valuable insights on diabetes mellitus and related physiology and treatments. Diabetes mellitus is a widespread chronic disease in the modern world that affects millions of people around the globe. In Singapore, one in ten of the population has diabetes, and the severity of the problem has prompted the country’s prime minister to talk about the disease at the National Day Rally in 2017. Designing an artificial pancreas that can provide effective blood glucose control for individuals with diabetes is one of the most challenging engineering problems. The author reports on research into the development of an implantable artificial pancreas that can regulate blood glucose levels by delivering appropriate dosages of insulin when necessary. By sensing blood glucose and injecting insulin directly into

the vein, the implantable device aims to remove delays that occur with subcutaneous blood glucose sensing and insulin delivery. Preliminary in-vitro and in-vivo experimental results suggest that the implantable device for blood glucose control could be a clinically viable alternative to pancreas transplant.