

# **Application of Test-Driven Development Techniques when Developing Biomedical Algorithms**

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Test-Driven Development (TDD) is becoming increasingly adopted for software development across a wide range of business applications. TDD's advantages include (1) expression of requirements by tests encourages customer involvement and leads to better product definition; (2) starting testing early help to produce more reliable products through decreased defect insertion into the product released to the consumer. We believed that equivalent advantages would be possible with TDD when developing biomedical embedded systems, despite the different product lifecycles between the business and medical worlds. We envision that the biomedical product development involves four stages (1) consultation with a research team of biomedical engineers and doctors (customers), (2) algorithm investigation in a language such as Matlab, (3) prototyping and (4) release of embedded product. Since bio-medical devices must meet strict safety requirements, the availability of common tests at all stages of development should be considered critical for the production of a reliable product. We discuss the limitations of existing automated test-framework in Matlab, and necessary extensions for the tool to be adequate for TDD. We provide information on the benefits and shortcomings of testing biomedical algorithms using a TDD approach. We will also show the similarity between TDD and scientific method; a similarity we believe will make the adoption of TDD in algorithm development natural for researchers.