

Oligomer Probe Sequence Design System in DNA Chips for Mutation Detection

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Abstract

삼성종합기술원에서는 인간의 genomic DNA의 이상을 발견하여 이와 연관된 질병을 진단하는 DNA chip을 개발하고 있다. 이를 위하여 특정한 염기서열의 변화에 따라 민감하게 hybridization strength가 변화하는 oligomer를 선택해야 한다. 따라서, specificity가 가장 큰 probe를 골라내야 한다. 여기에는 열역학적인 고려와 여러가지 물리화학적인 approximation이 사용되며, DNA chip 생산 공정에 의존하는 요소도 포함되어 있다. 모든 생산용 data와 결과의 분석은 database를 기반으로 이루어지며, 자동화된 통계적 분석법과 최적화 방법이 함께 사용된다.

CV

1997년-현재: 삼성종합기술원 CSE Center 근무 중,

Bioinformatics Technology Leader, Biochip Informatics 과제 PM

1988년-1992년: 포항공과대학교 신소재공학과(학사) 졸업

1992년-1997년: University of Illinois at Urbana-Champaign, Department of
Materials Sci. & Eng.(박사) 졸업(고분자 분자모델링 전공)



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삼성종합기술원
Biochip Project Team
Bioinformatics TL 이규상 전문



Biochip Project team in SAIT

- Biochip Project team (기흥, 대전)
- Development of DNA chips
 - oligomer-based
 - inherent disease : diagnosis by genomic DNA mutation identification
- Bioinformatics research
 - product related
 - in-house LIMS, data mining
 - DNA chip design, data analysis



연구 개발 목적

- 단기 목표
 - infrastructure
 - public, private databases
 - DNA chip development
 - probe design system
 - data mining system
- 더 빠르게 보다 정확하게!!!

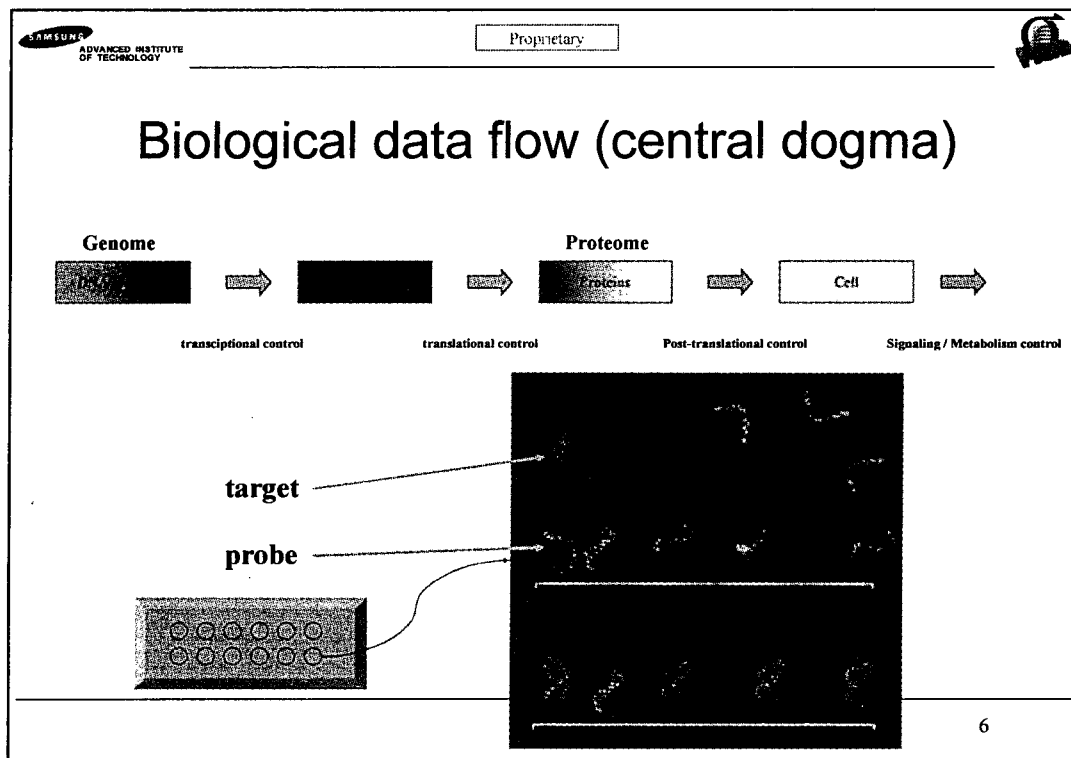
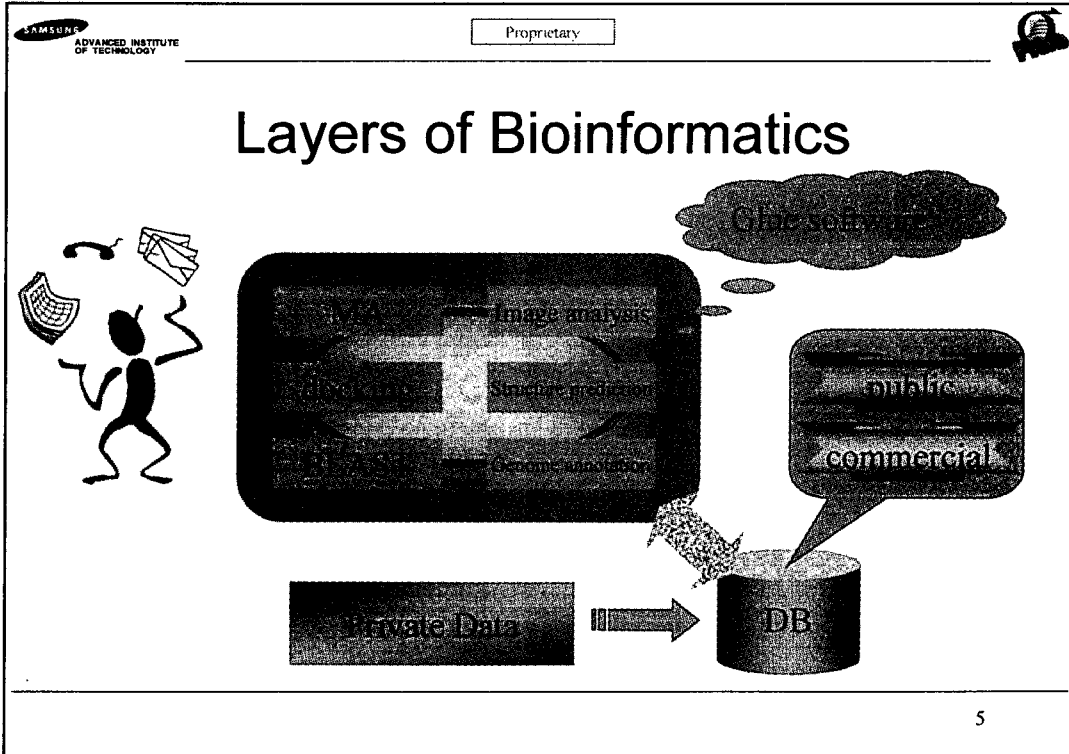
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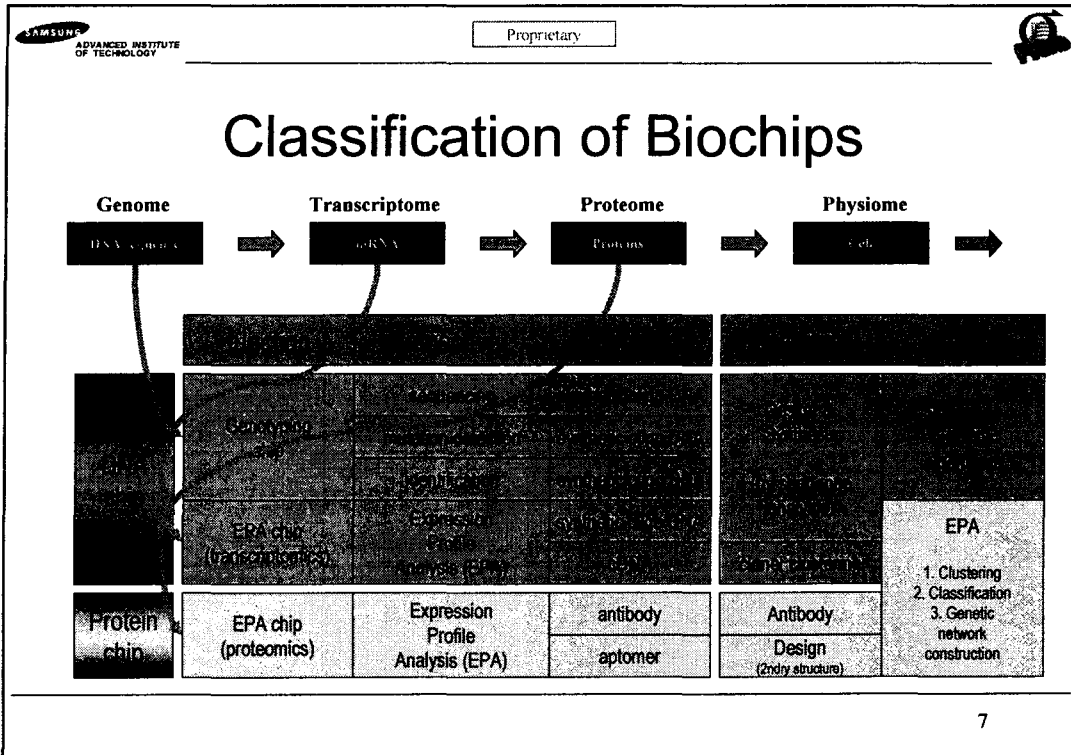


General role of Bioinformatics

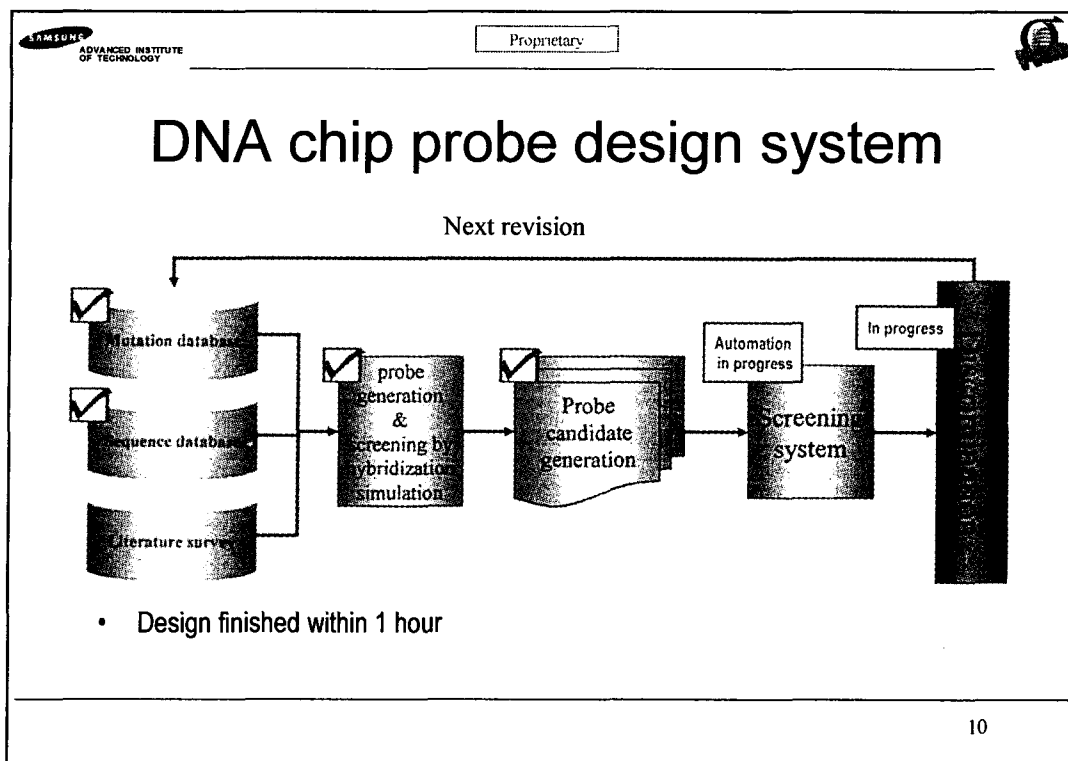
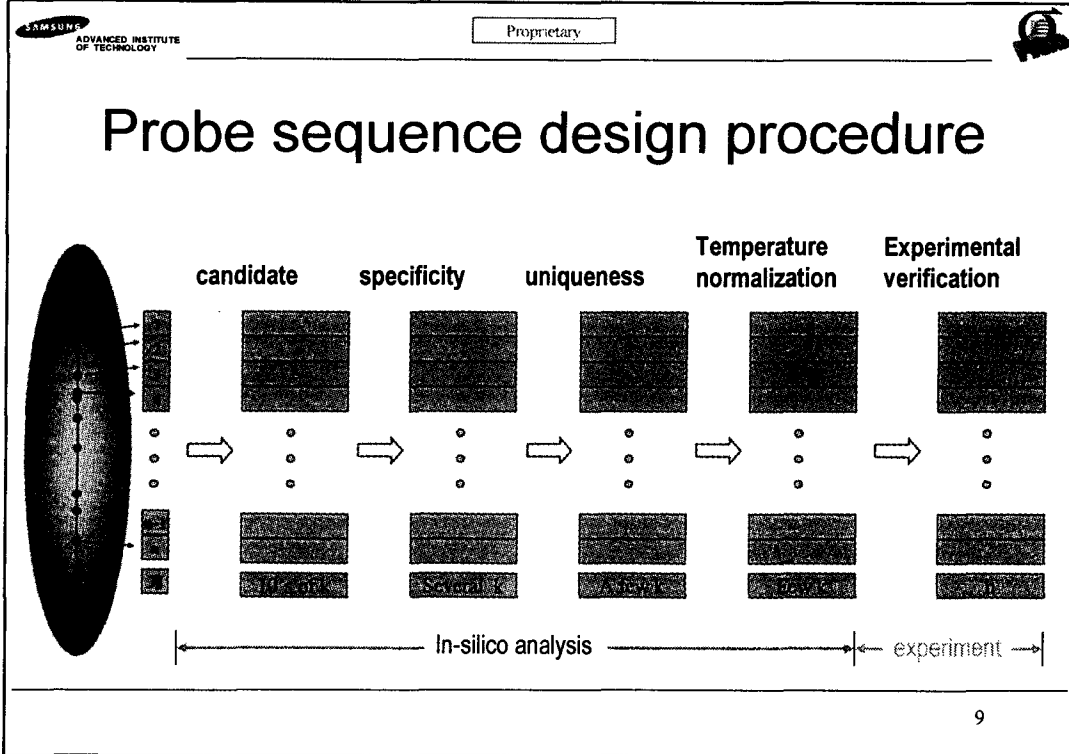
- Biological Test Bench: Animal and plant model systems
- High Throughput Molecular Analysis:
 - sequencing, combinatorial chemistry
 - gene expression, proteomics
 - SNP's
- Database & Integration
- Basic Data mining & Visualization : Exploration
- Advanced data mining reverse engineering & network modeling: Inference & Prediction

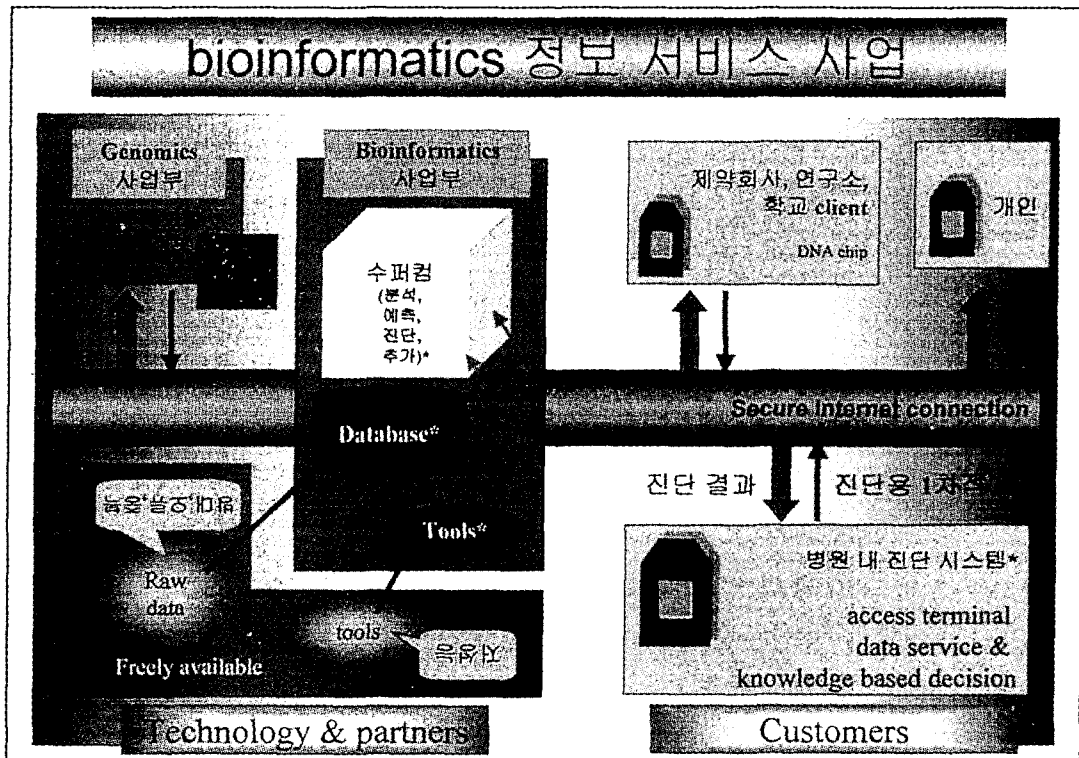
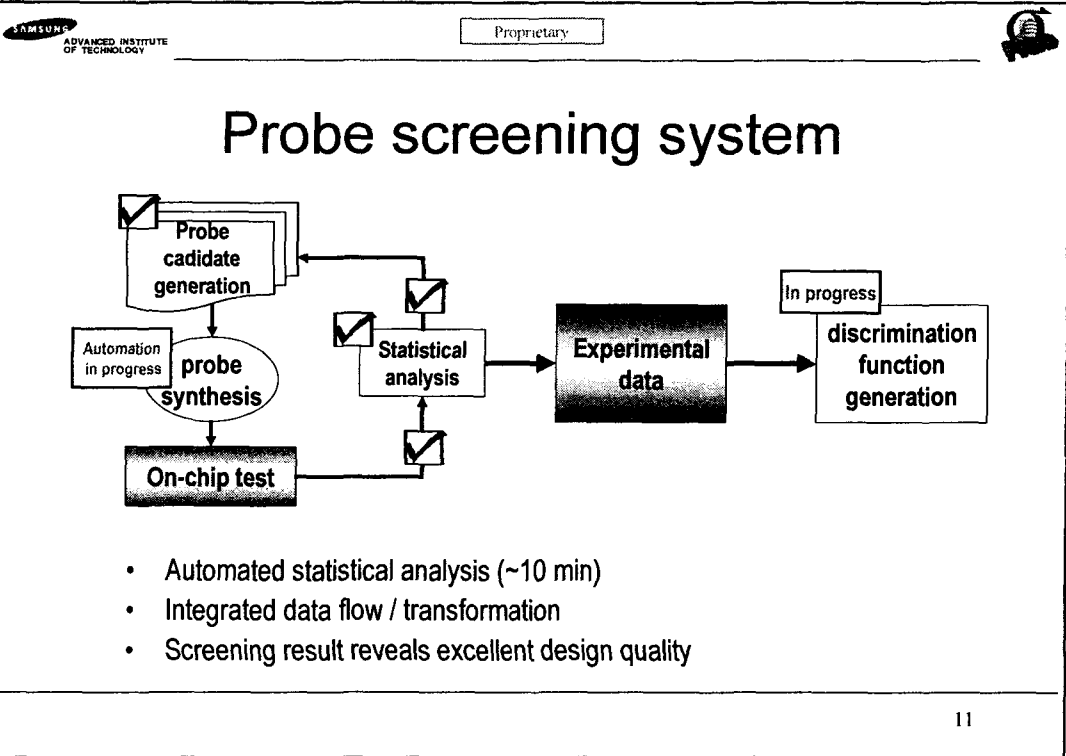
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- Proprietary
- ## Issues in genotyping DNA chip design
- Probe Design (selection)
 - Chip Design (strategy planning)
 - Probe screening (verification)
 - on-chip experimental data analysis, automation
 - Critical To Quality
 - good quality probe sequence : accuracy
 - probe screening speed : quick(!)
 - design and analysis is not a bottle neck anymore
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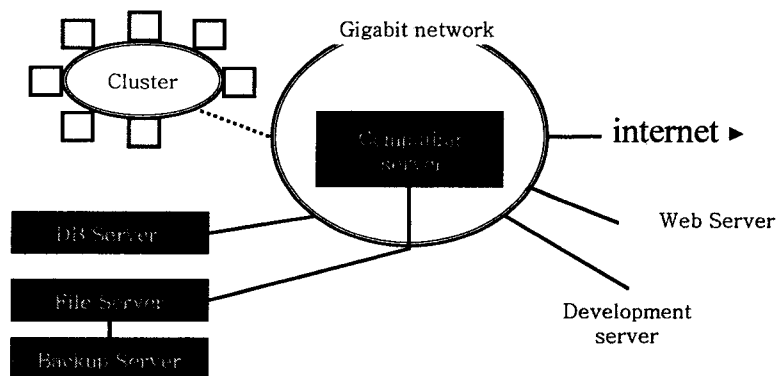






BI-Infrastructure : database

- cyber organism : self growing database
 - fully automatic Research & Biz Development environment



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BI-Infrastructure : data integration

- Industrial Bioinformatics
 - DNA chip oriented
 - LIMS
 - data mining system
 - new product development platform
 - database
 - bio-information processing
- Parallelized BLAST Linux farm

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Future work

- Probe design quality perfection
 - full automation of design process
 - versatile design capability
- Probe screening capability
 - Higher capacity of data analysis
 - probe selection process automation
 - data mining system for performance improve
 - probe performance simulator
- ...