
Sonitus
Capture the imagination

Agenda

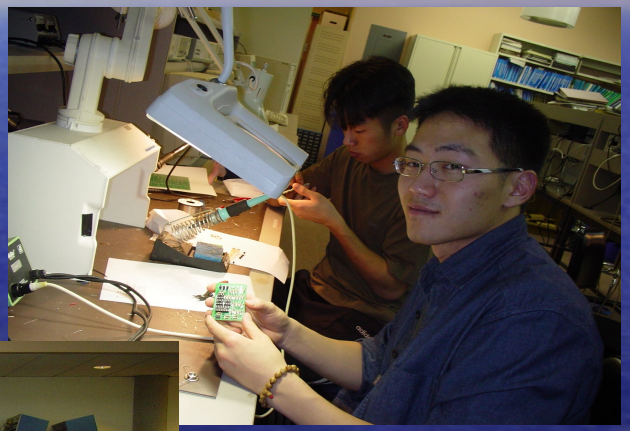
- Introduction
- System Overview
- Transmit stage
- Receive stage
- Data stage
- Market
- Conclusion
- Q&A

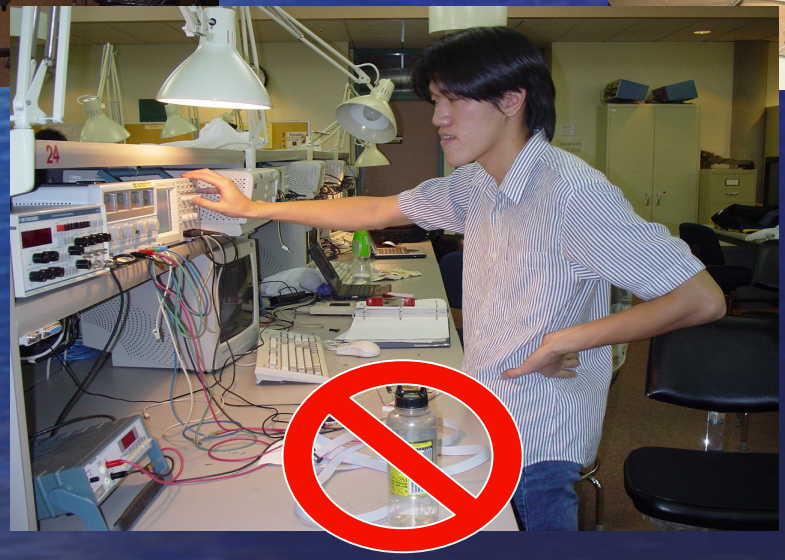
Introduction

- Group Members
  - President: Richard Sheng
  - CEO: Warren Lee
  - CFO: Alan Chuang
  - CTO: Henry Lin
  - COO: Edward Loo
  - CMO: Kenneth Fong

Pictures

Pictures (cont'd)



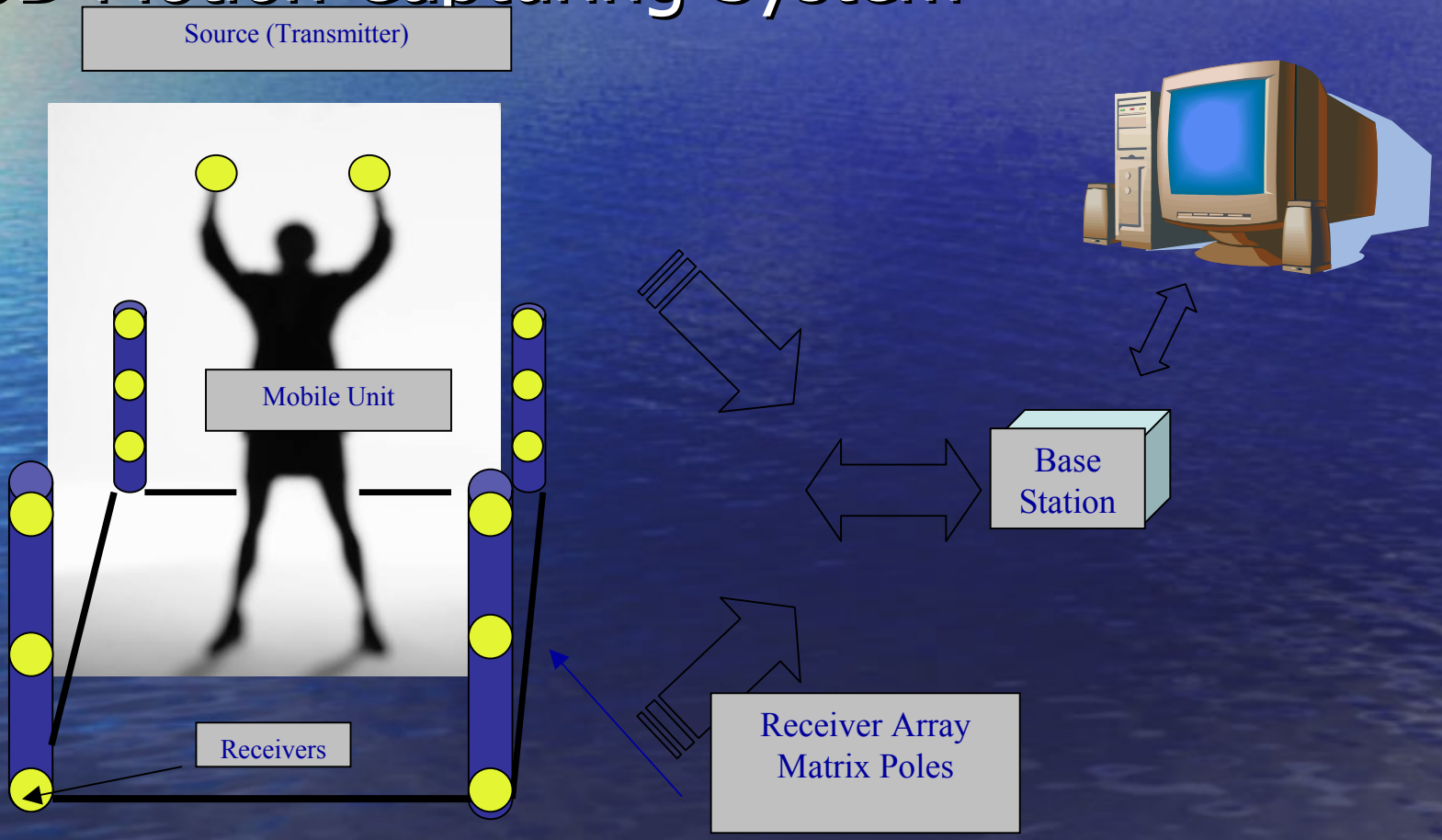


Introduction (cont'd)

- Purpose
  - 3D Motion Capturing
- Technology Types
  - Optical
  - Magnetic
  - Mechanical
  - Acoustic

System Overview

- 3D Motion Capturing System

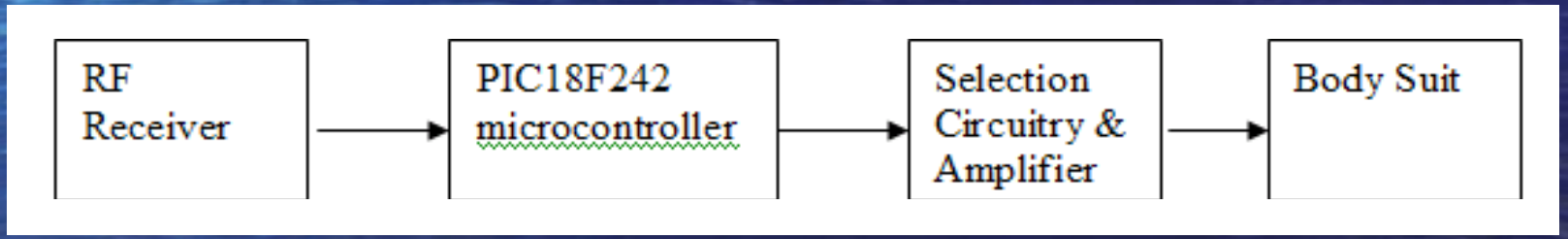


Transmit Stage

- Base Station
  - "The Brain" of the system
  - Decide which transmitter to send
  - Time difference measurement
- RF communication
  - Used to communicate with Mobile station
  - Start of time measurement

Transmit Stage (cont'd)

- Mobile Unit
  - Captures and decodes the RF pulse
  - Turn ultrasonic transmitter on
  - Pulse generation



Transmit Stage (cont'd)

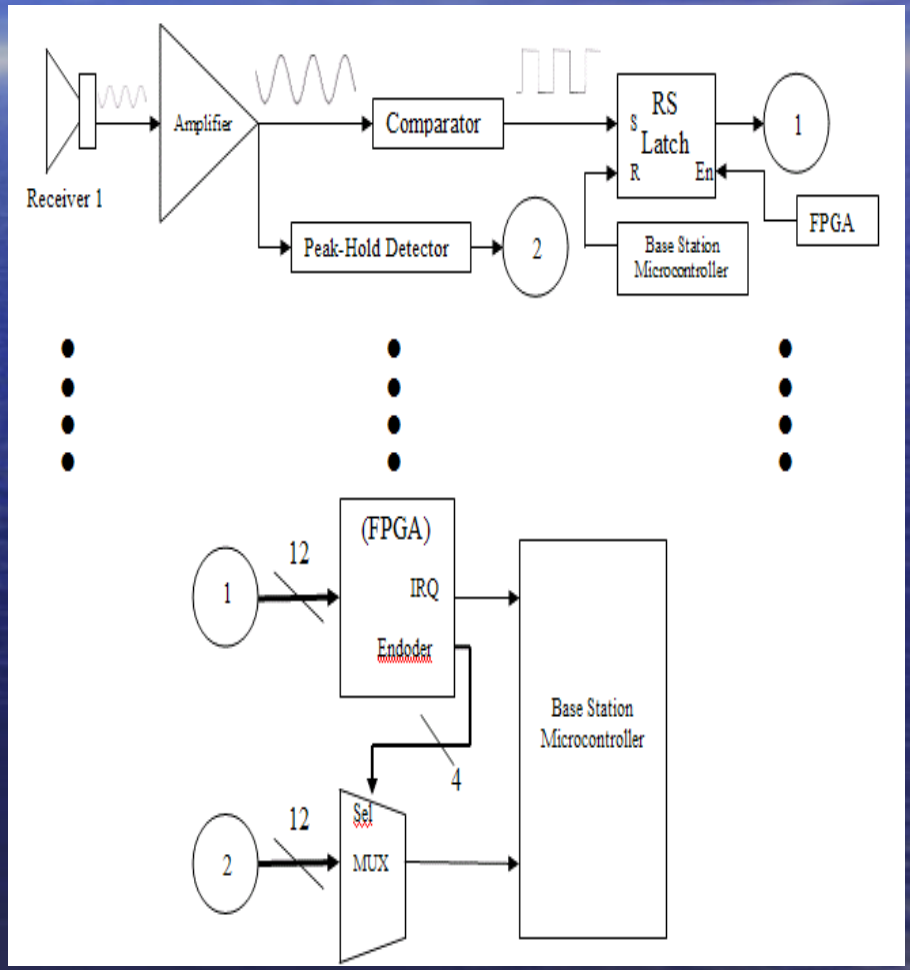
Body Suit

Receive Stage

- Ultrasonic receiver
  - Picks up pulse sent by mobile unit
- Noise rejection amp circuit
  - Takes signal from receiver
  - Provides non-linear gain
  - Rejects ambient noise

Receive Stage (cont'd)

- Receiver array matrix board
  - Captures which receivers turned on first (up to 4 sets)
  - Interrupt generated to Base Station
  - Channel disabled temporarily
  - Peak hold detection used to measure phase error
  - Analog to Digital Converter

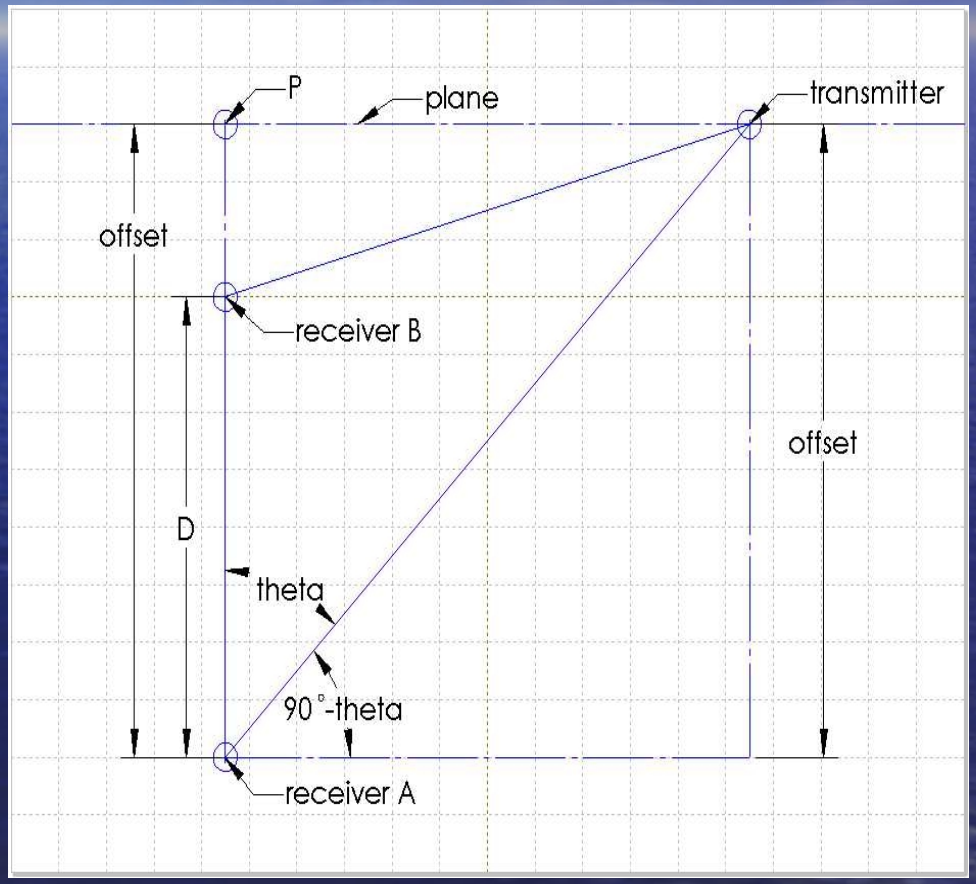


Data Stage

- Base Station
  - Once interrupt receives, captures Signal ID
  - Calculates time difference, acquires A/D results
  - Data sent to PC via Serial
  - RAM Board temporarily disabled
- Triangulation
  - Converts time difference to distances
  - Distances triangulated to normalized coordinate in space

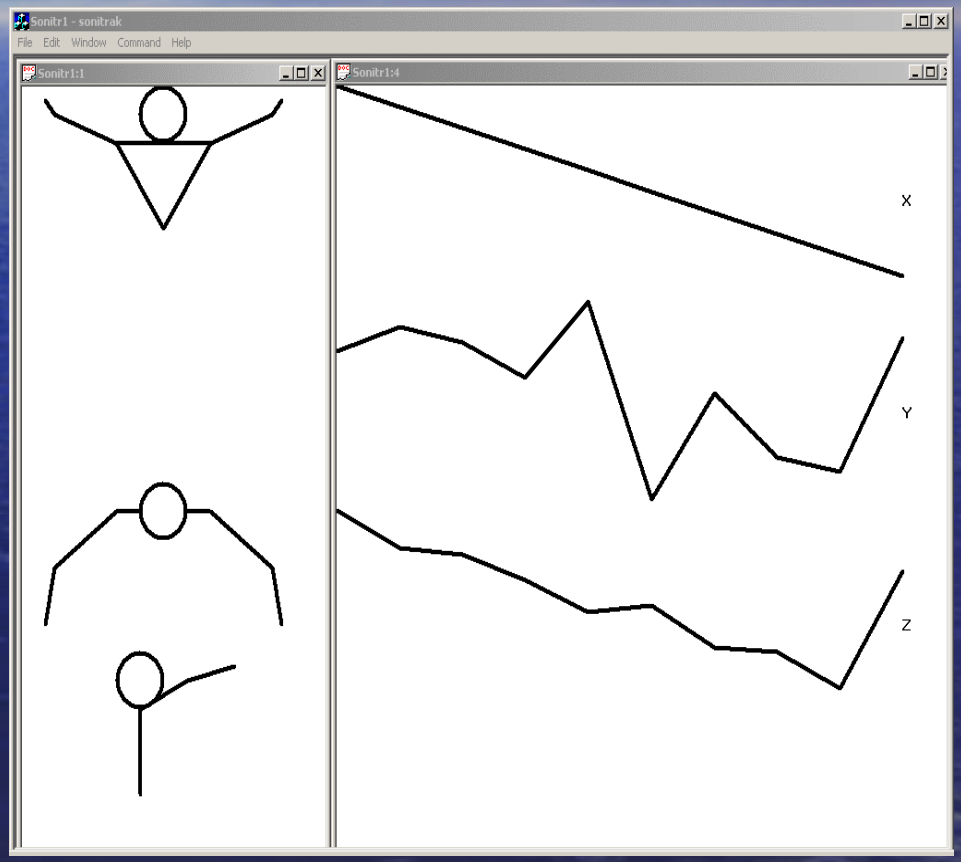
Data Stage (cont'd)

- Triangulation
  - Algorithm 1
    - 4 data sets
    - Trigonometric calculation
  - Algorithm 2
    - 3 data sets
    - Iterative calculation



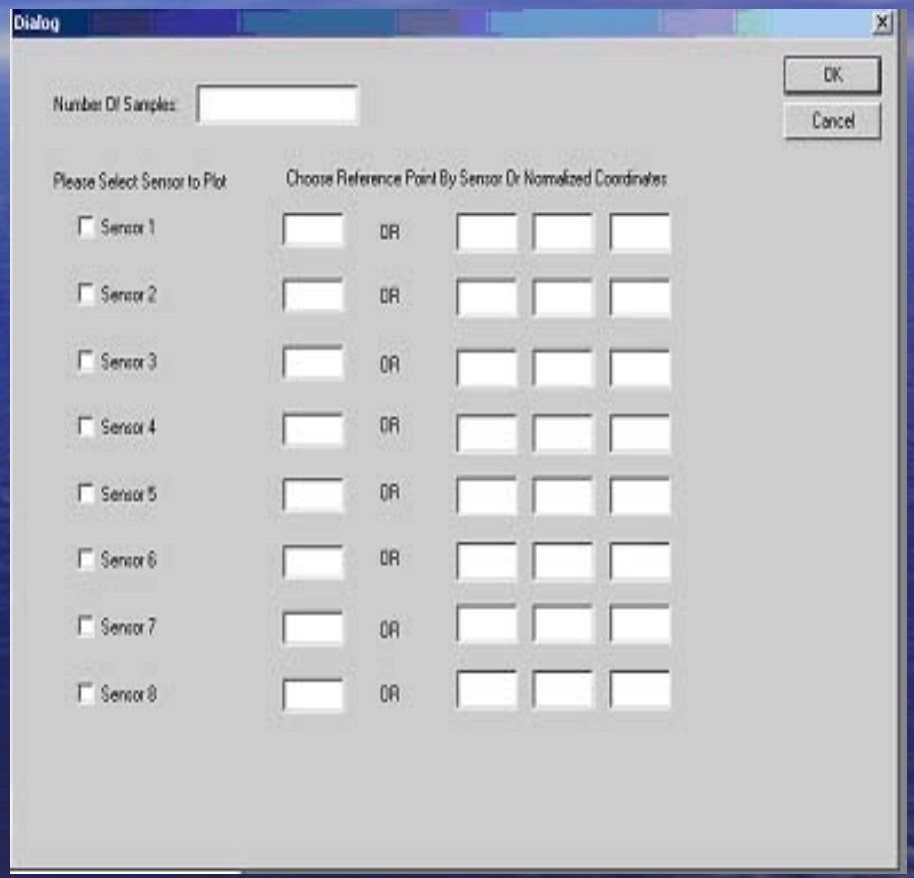
Data Stage (cont'd)

- Graphical User Interface
  - Visual C++ with MFC
  - Left window real-time visual representation of the user
  - Right (multiple) windows displays sampled data in graph format



Data Stage (cont'd)

- Sampling Control
  - Number of samples (at 17ms period)
  - Select which sensors (transmitter channels) to plot
  - For each channel, reference can be set by the location of another channel, or constant.



Market

- Target Customer: Research
  - Universities, talked to Kinesiology Faculty of SFU
  - Industrial research labs
- Market's current status
  - Relatively small industry
    - 44 companies as of Feb 1999
- Target Price: $5 000 ~ $15 000

Market (con't)

- Other possible customers
  - Game industry, Medical research facilities, Entertainment industry
- Possible partners
  - Universities, other Instrumentation Engineering firms (to provide a broader range of products)
- Our competitive edge
  - Low cost (approx. 1/6 of industry price)
- Our competitors

Competitors (cont'd)

- Intersense
  - Multi-million dollar company established before tech boom
  - Ultrasonic/inertial tracking products
  - NASA space station robot arm controller
  - VR simulation tracked 3D glasses
    - Helicopter
    - Japan motorcycle(learning)
    - automobile test drive
    - robot navigation AI programming
    - nanomachinary prototyping

Competitors (cont'd)

- Northern Digital
  - Used at SFU
  - Optical Technology
  - Image guided surgery
    - Medical robotics
    - image guided dental implantology
    - navigation of surgical microscopes

Conclusion

Improvement considerations (& why they weren't implemented):

- Higher frequency ultrasonic transducers for better accuracy (costs 5 times more)
- Separate A/D to improve resolution for better phase correction delay (ran out of time)
- Better Quality ultrasonic transducers for faster ramp up time and sensitivity (cost)
- Self calibrating receiver array (pipes are hard enough to work with)
- Faster microprocessor (ours was free)

Conclusion (cont'd)

Budget:

- Proposed: approx. $1100
- Spent: approx. $1200
- Overspent on back-up parts

Lessons Learned:

1. Coupling capacitors are our friends
2. Cross talk … bad
3. Creativity does not always imply ingenuity (working)

Group Dynamics

Q&A

- What does RAM stand for?
- Name 2 other types of technology possible for motion capture.
- How many nights did we sleep at school?

Answers

- Receiver Array Matrix
- Optical and Magnetic
- Approximately 20