Automated Dartboard Scoring

6.111 Final Project By:
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Project Concept

- Dart scoring in local leagues is performed by hand
- Why not automate this repetitive task?

Rules of 301

Player 1		Player 2	
301		301	
254	47	38	263
200	54	20	243
.		.	
.		.	
.		.	
0	Winner	52	loser

Dart Detection

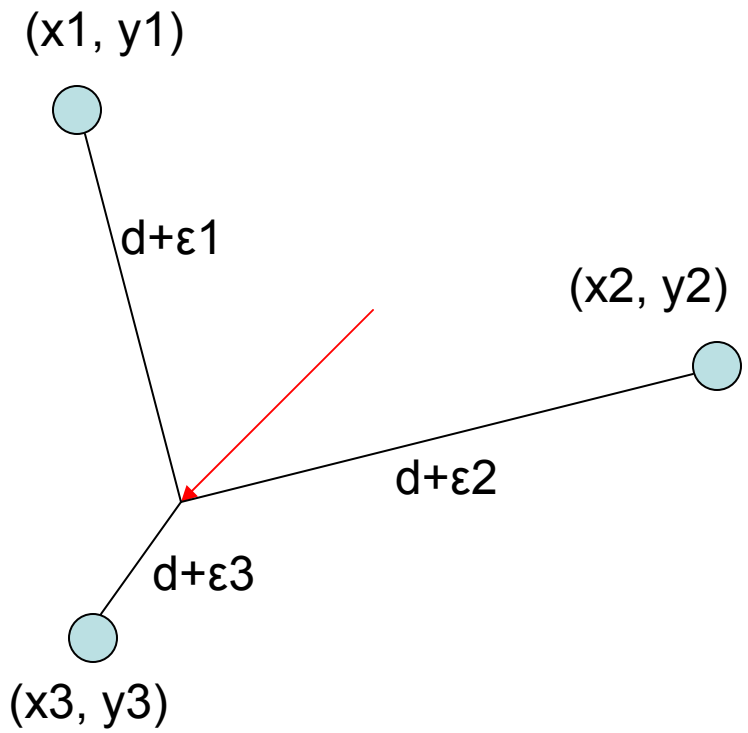
- Microphone Triangulation
- Use difference in time between when dart signal reaches microphone

$(d-\varepsilon_1)^2 = (x-x_1)^2 + (y-y_1)^2$

$(d-\varepsilon_2)^2 = (x-x_2)^2 + (y-y_2)^2$

$(d-\varepsilon_3)^2 = (x-x_3)^2 + (y-y_3)^2$

- 3 equations…3 unknowns (x, y, d)

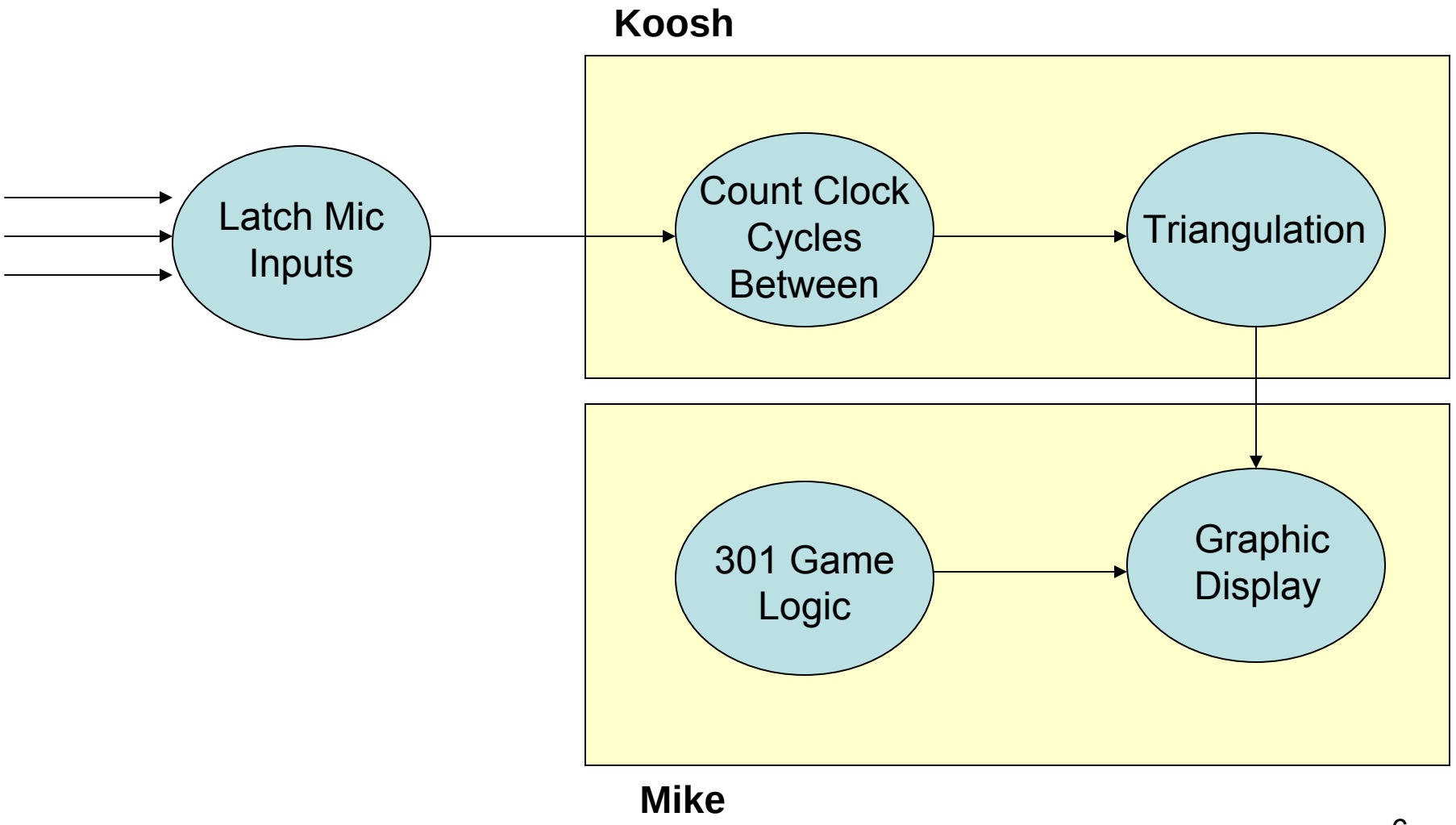


Dart Detection Resolution

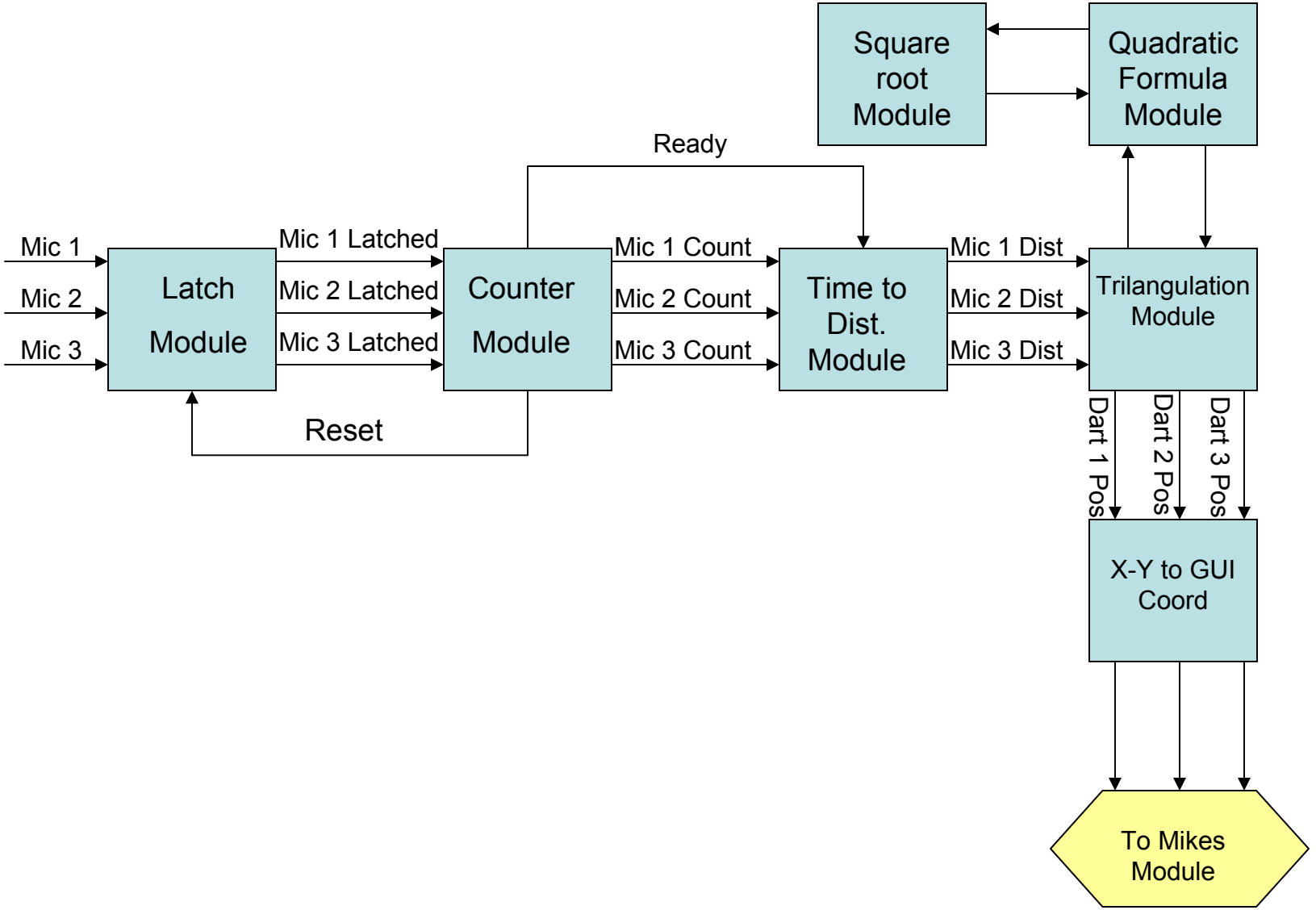
- Speed of Sound = 340.29 m/s
- Clock Speed = 1MHz
- Resolution = $\frac{340.29\text{m/s}}{1{,}000{,}000\text{ Hz}}$ = .00034 m/cycle

  < 1mm/cycle
- Problems With This:
  - Delay of analog circuitry
  - Peak detection

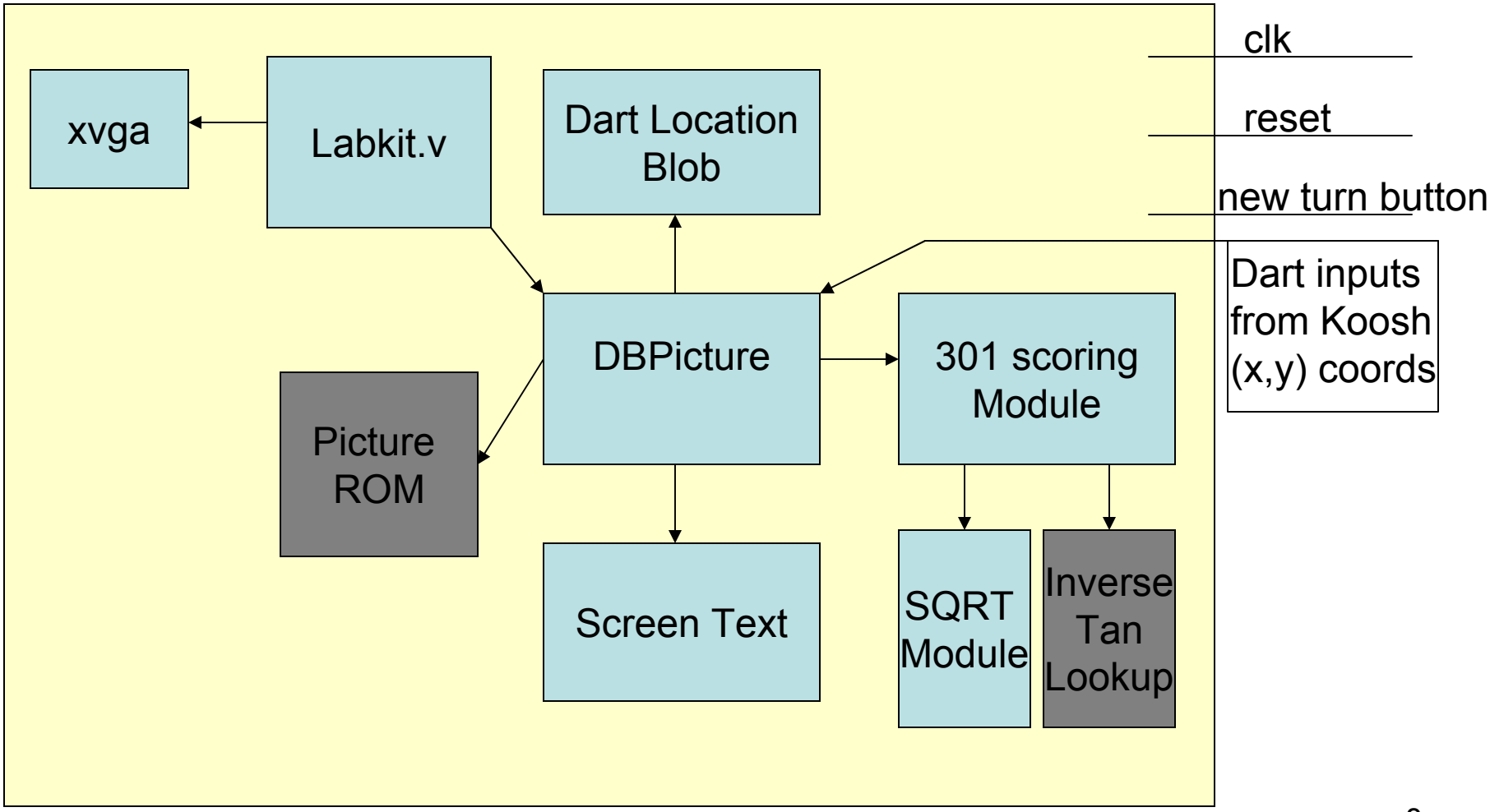
High Level Project Description



Koosh's Block Diagram



Mike's Block Diagram



Must Haves

- 301 game play without double in and double out rule
- 2 player games
- Graphical display on screen
- Dart detection within 1 inch

Nice To Haves

- Fixing incorrect dart placement
- Correction for darts that don’t stick in the board
- Other games (like 601, cricket)
- Target practice
- Dart detection within 1cm
- Detecting doubles and triples