WWW.MWFTR.COM

Hockey Puck Tracking System

Paul Booker
Nia Bradley
Ebonie Davis
Pameshanand Mahase
Duane Smiley
Daniel Ward

Background

- Ease of loss of the hockey puck due to parameters such as:
  - Small size—NHL regulation pucks are 3 inches in diameter: 1 inch thick
  - Puck moves very quickly, sometimes in unexpected directions
- Problem vision
  - Need for better hockey puck tracking system

Problem Formulation

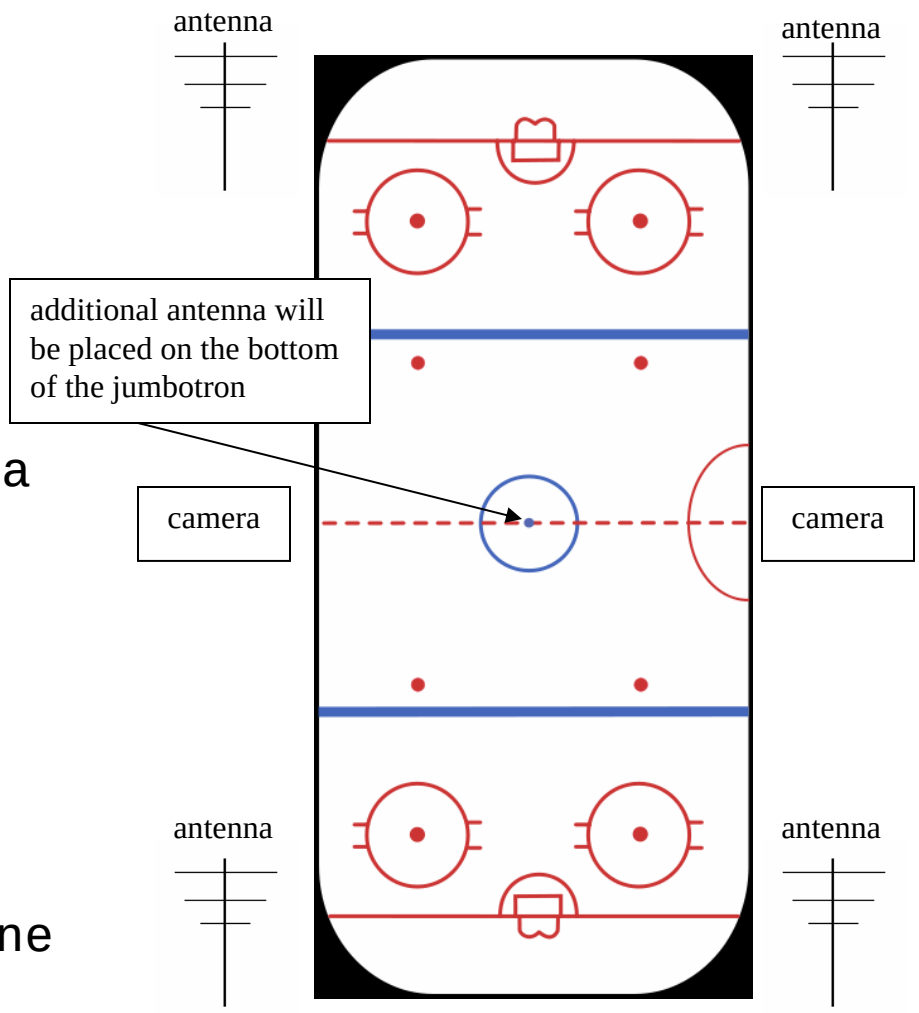
- Components
  - Transmitter device for hockey puck
  - Antenna
  - Transmitter-receiver
  - Computer controlled motor for camera movement
- Electronic equipment operation
  - 12-24 VDC
  - 120 VAC (US & Canada) and 220- 240 VAC (other countries)
- Embedded transmitter
  - 70mm x 70mm
- Antennas - inconspicuous
- Camera base large enough to accommodate all camera tripod sizes

Problem Formulation

- Regulations
  - Comply with FCC part 15 subsections C and D
- Transmitter device
  - IEEE 1902.1
- Final product
  - Product reliability - IEEE Standard 1332-1998
- European Union Directive (90/544/EEC) must be followed for European customers
- Adherence to Canadian ICES-003 is mandatory for sales in Canada

Solution Approach – primary idea

- Primary Solution: Radio Signaling System
  - Embedded radio tag
  - 4-5 antennas
  - 2 motorized camera bases
  - 1 reader for each camera
- Advantages:
  - Fewer cameras makes position programming simpler
- Disadvantages:
  - Lack of cameras could complicate situation if one camera fails

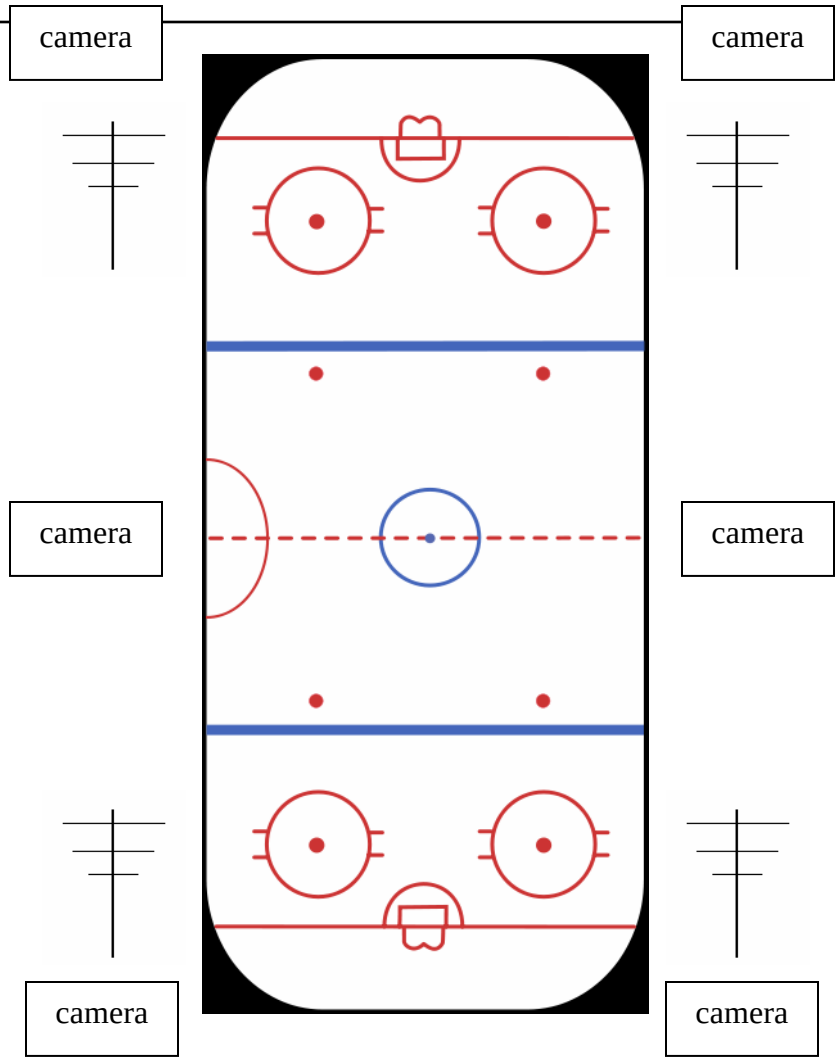


Solution Approach – Alternative 1

- Alternate Solution: Integrated Camera Circuit
  - Camera tracks the puck instead of the motorized base.
  - Setup of cameras, tag, and antennas will be the same
- Advantages:
  - Less mechanical parts
- Disadvantages:
  - More complicated to design

Solution Approach – Alternative 2

- Alternate Solution: 6-camera grid
  - 6 cameras cover 6 areas of rink
- Advantages:
  - Less stress on motors
- Disadvantages:
  - More position programming needed



Tasks & Project Management

November 2007

- Prepare to present proposed idea to a group of professors for evaluation.

December 2007

- Finalize Low-Level specifications
  - Design schematics
  - Identify all components
  - Component Interfaces
- Budget review
- Buy parts for prototype

January 2008

- Initial Building and Testing
  - Implant Transmitting device
  - Create Controlled Environment
- Establish Communication
  - Transmitting Device w/Antennas
  - Antennas w/Receiver
- Test Functionality

February 2008

- Build Motor Base
- Create Motor Control Program
- Establish communication
  - Transmitter w/Motor Base
  - Test Functionality
- Control of Motor Base

March 2008

- Completed design

Planned Deliverables

- Complete:
  - High-level and low-level concepts
  - Management of project
  - Assembly of prototype
- Major Deliverable
  - Hockey Puck Tracking System
- Demonstration
  - Create Controlled Environment
    - Box (size of average door)
  - Utilize Hockey Puck Tracking System
    - Antennas
    - Transmitted
    - Transmitter-Receiver
    - Motorized Base
    - LED Pointer
  - Replica

Cost & Resources

- **Resources**
  - *The Internet*
  - *CEACS Faculty and Professors*
  - *NHL – National Hockey League*
- **Projected Budget**
  - Electric Motor - $350
  - Framing Material for Base - $50
  - Transmitter device - $2/device
  - Antenna - $150
  - Transmitter-receiver - $200
  - Computer Software – Free
    - VHDL
    - C++

Conclusion

- Team HPT is looking forward to exploring various approaches to meeting the needs of a tracking system for implementation into the game of hockey
- Design Process Outline
  - Project approval
  - High-level and low-level concepts
  - Management of project
  - Prototype assembly
  - Completion of final design