Objective

The Shot Buddy

Concept Generation

General Need: Maximize time an individual has to practice shooting by automating the shot-return process.

CTQ Customer Requirements

• Accurate ball return
• Does not jam
• Catch missed and made shots

CTQ Engineering Characteristics

• Catch area
• Accuracy of return
• Probability of jamming
• Work required to rotate

Constraints

• Sensor distance capability
• 180 degree return range
• Discrete sensor return lanes
• Gravity based return

Market Need: Market size is 240,000 based on statistics in Baltimore/Washington area

Focus on parents of basketball players aged 10-18

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• 180 degree return range
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Key Equations

\[ \frac{1}{2}m v_f^2 = m g h \]

\[ y = \left( \frac{1}{2} \right) a t^2 + v_{oy} t + y_i \]

\[ F = \Delta p / \Delta t = m \Delta v / \Delta t = (0.64 \text{ kg}) \times (8.62 \text{ m/s}) / (0.1 \text{ s}) = 55.2 \text{ N} \]

Strenghts

• Accurate Return
• Stable Setup
• Heavy Design
• Possibility of Jamming

Drawbacks

• Inaccurate
• Catchs Fewer Shots

Strengths

• Prevents Jamming
• Tool-less setup
• Quick rotation

Drawbacks

• Inaccurate

FBD and Selected Results

1. Ball is caught in the net (5)
2. Ball drops to trampoline (7) via the drop out (18)
3. IR sensors (16) detect a IR LED attached to the user
4. Motor (14) adjusts the trampoline (7) to face user

• Motor positions trampoline according to set return lanes (Fig 1)
• The prototype is able to quickly and automatically return the ball to the user.

Design

Prototype and Testing

Test Setup

Variable - Use of return device
Control - No return device
Measure - Total shots taken in 2 minutes from various court locations

Results and Future Work

Project Summary

• Identified recreational need among significant population and designed product to help basketball players maximize their practice time

Recommendations for Future

• Investigate alternative sensor designs
• Design for easy mounting and driveway compatibility
• Assemble funnel net frame out of aluminum

Patentability and Other Similar Products

• New integration of sensor technology for automated return
• Most impressive competitor requires manual chute rotation

Process Reflection

• Concept Generation - Multiple Unique Alternatives
• HOQ - Identify EC’s and CR’s
• AHP - Evaluate DC’s