Defense Proposal

Quadcopter Ball Catcher

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(Defense Proposal)

Project Code

Project Advisor:

Dr Fahad Javed

Project Team:

Adnan Shafique   11105033
Subhan Ali   11105016
Zeeshan Afzal   11105003
Mamoona Sikander   11105014

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1. Abstract

Quadcopters are unmanned aerial vehicles having four rotors. These are being modified as drone Quadcopter. Quadcopters can be modified into a device that can catch an object thrown towards them. To attain this purpose following steps will be followed:

- First of all Quadcopter will specify its current location in the specified arena and will inform the computer.
- Kinect will detect the ball in specified arena and will pass some useful parameters to the computer.
- Computer will use these parameters to predict the ball's upcoming position.
- Resulting values will be sent to transmitter.
- Transmitter will send signals to the Quadcopter.
- Quadcopter will receive the signals from computer to perform the actions accordingly.

The process will be accomplished by using control processing and vision processing.

2. Background and Justification

Our inspiration is Raffaello D'Anderea's presentation entitled 'Feedback Control and the Coming Machine Revolution', in which he used the FMA Quadcopters to demonstrate the principles of feedback control and how novel technologies enable the design and operation of high-performance machines.

3. Project Scope

In this project our Quadcopter will use control processing and vision processing mechanisms to catch the ball thrown towards it. Position detection of ball will be done through vision processing. Trajectory formula will be used to predict the ground hitting position of the ball. Quadcopter will catch the ball using control processing. Communication between Quadcopter and computer will be through Wi-Fi using transmission protocols.
Experimental module toy car is using radio frequency communication between car and remote. Serial port communication is used between laptop and remote.

4. Learning Outcomes

- Technology of the Quadcopter.
- Usage of vision processing
- Usage of control processing
- How flying machines will serve people in providing facilities
- Constructing autonomous systems
- Sensor usage

5. Practical Applications

Ball catching technique could be enhanced into bullets shields .Bullet shield is a device that protects its target from upcoming bullet fired to hit him. Quadcoptercould be able to catch upcoming bullet to save bullet target from being hit. Control processing procedure

will be same for Quadcopter movements and bullet detection process will be changed.

6. Project Goal

In our project Quadcopter will be flying in the specified arena. We will have the initial position of Quadcopter. Ball's trajectory will be given by the Kinect or PixyCMUCam. Through this trajectory we'll predict the upcoming location of the ball and the Quadcopter will be instruct by algorithms to move for catching the ball and will get back to its initial position.

7. Additional Goals

Quadcopter will not breach the specified Arena's boundaries.
After catching the ball Quadcopter will get back to its initial position.

8. Environment Constraints

Initially we will not handle
1. Air resistance.
2. Light intensity.
3. Background colors.

9. Special Requirements

- Arduino Software
- Arduino Board
- Quadcopter
- Kinect
- Pixy CMU camera
- Net Walls

10. References

http://flyingmachinearena.org/research/