LYU1401 - AndroidCopter

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Recap - Architecture

Remote Control Panel

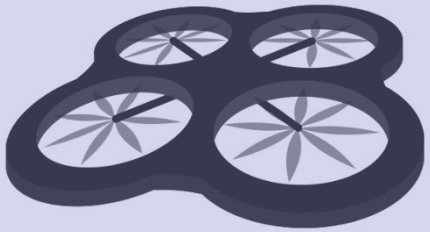
Send Control Command

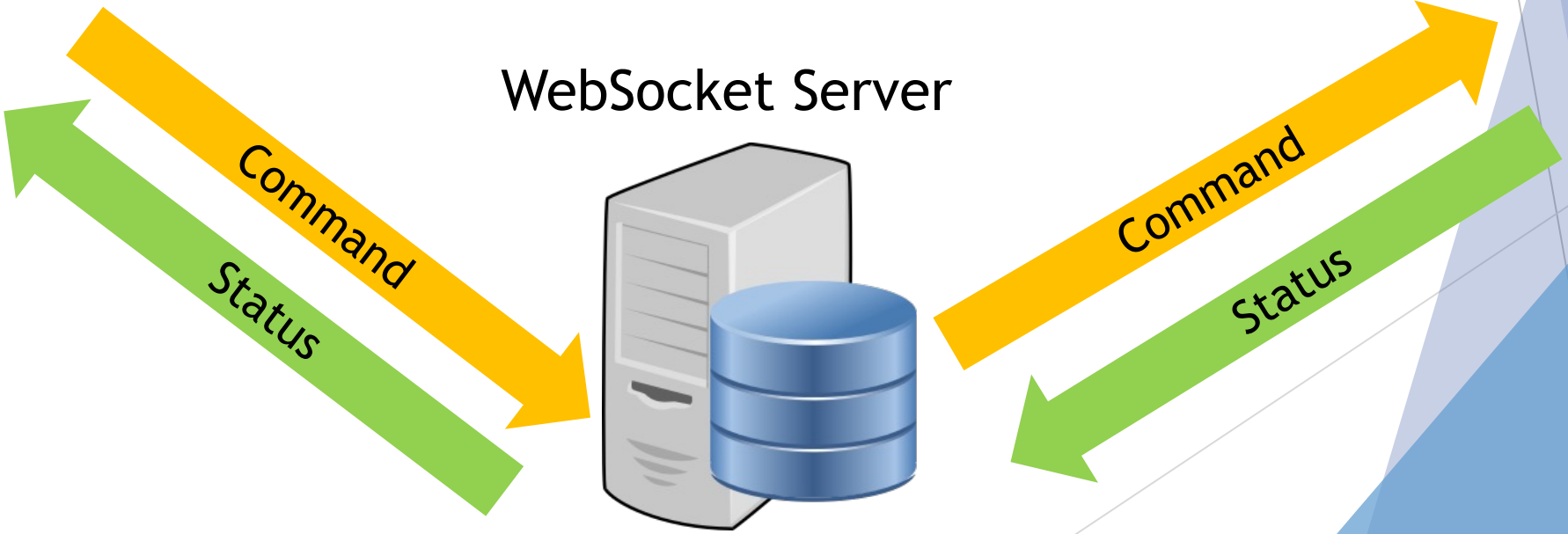
Receive the status

AndroidCopter

Receive Control Command

Send the status





Recap - Milestone

- Stabilize

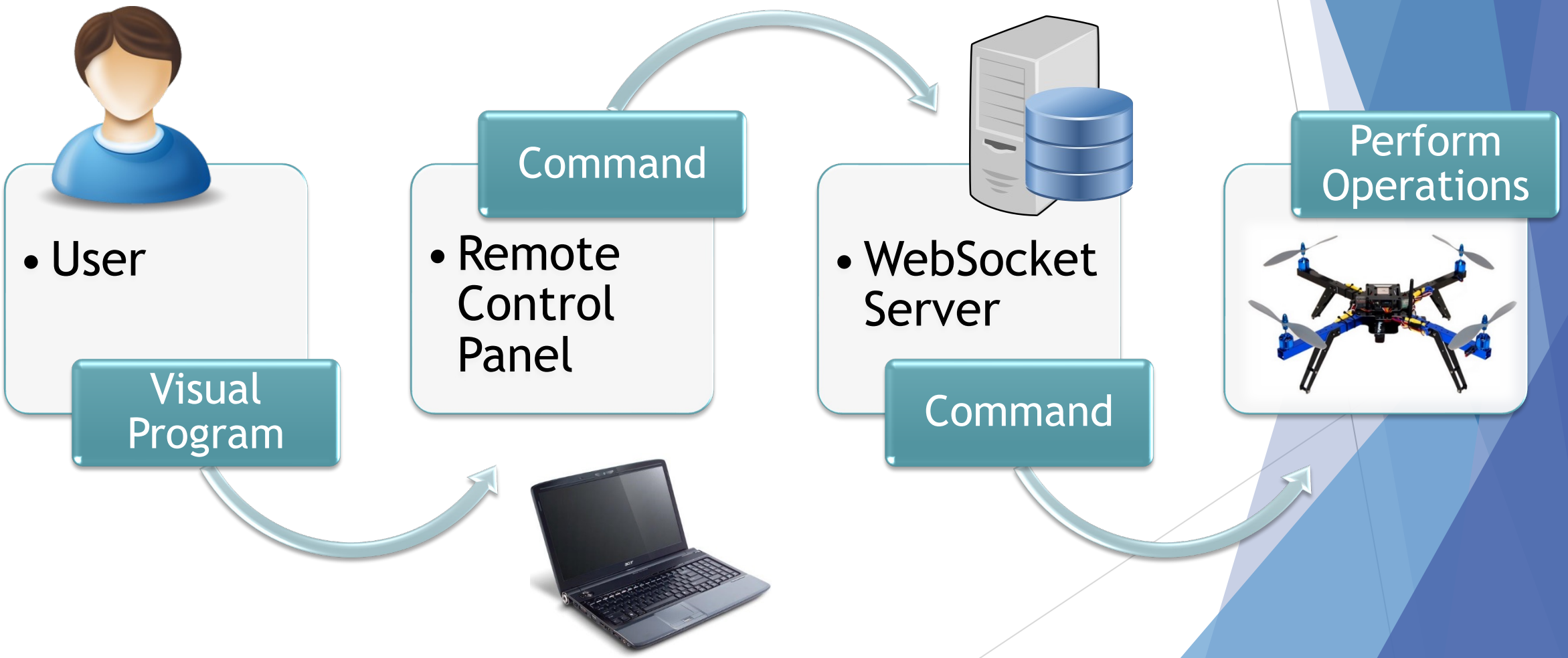
Recap - Milestone

- Control manually
- Take video and photo

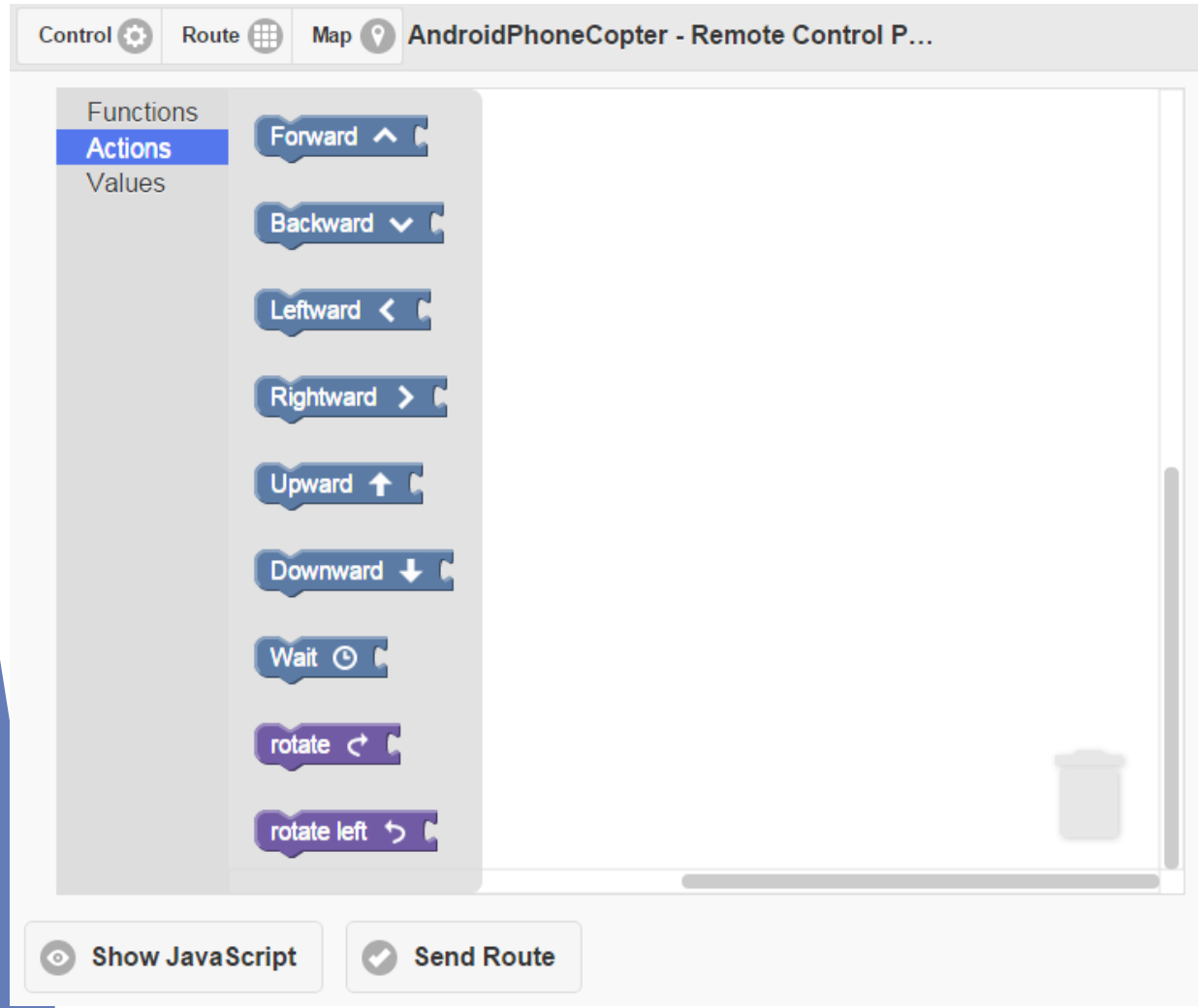
Objectives

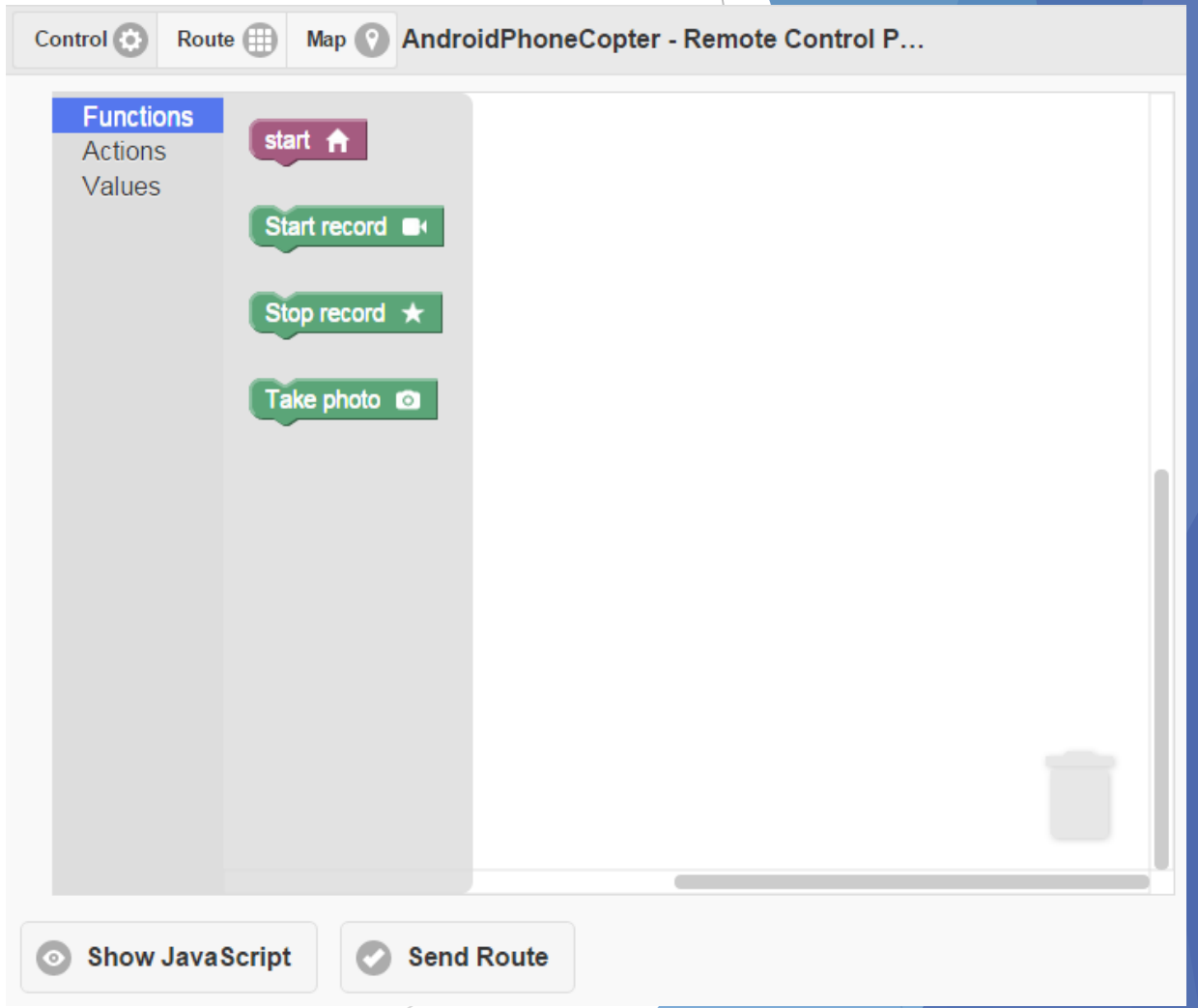
1. Autopilot
    1. Indoor path planning using Visual Programming
    2. Push a program to AndroidCopter
2. Improve the stabilization with optical flow sensor

Data Flow Diagram

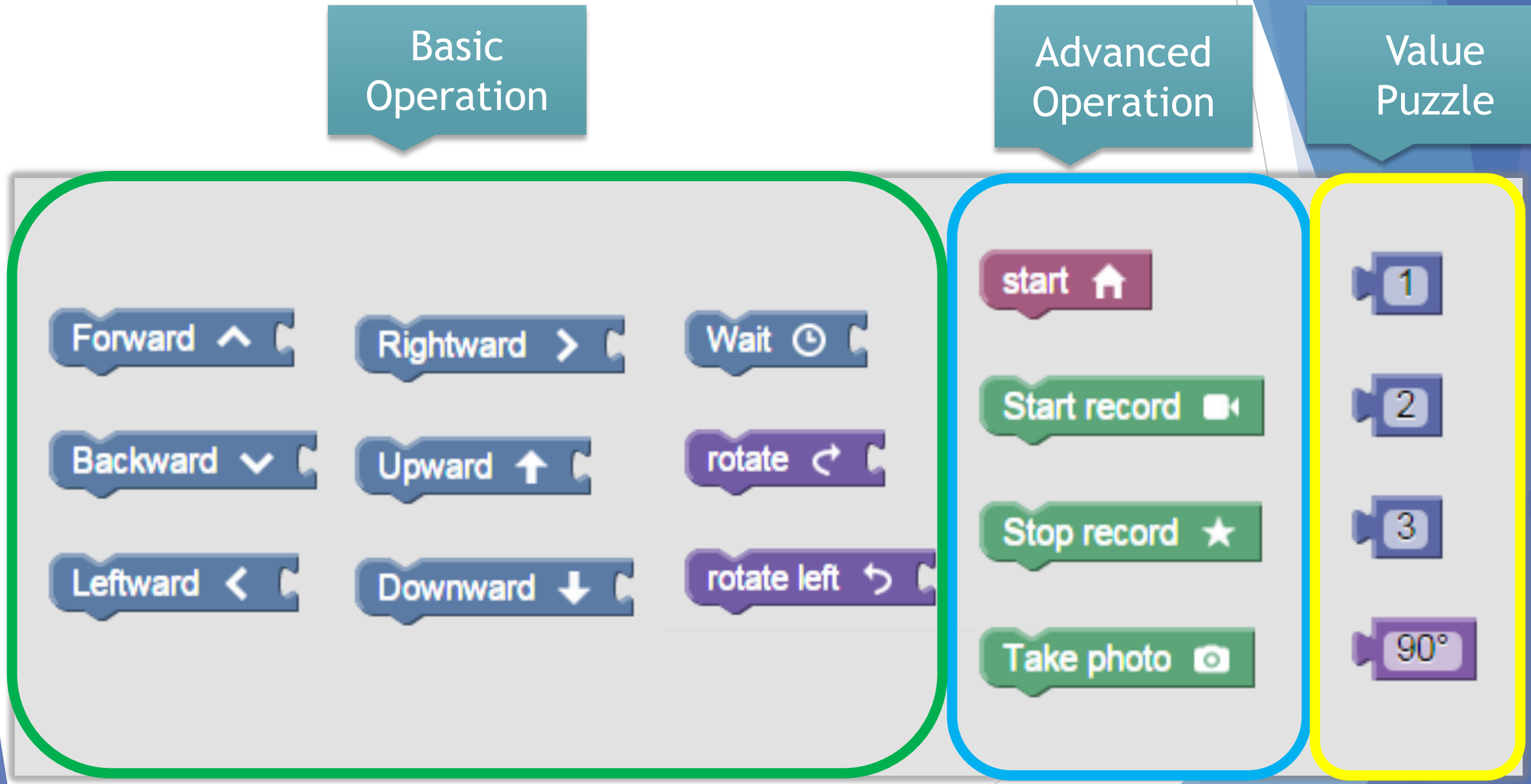


Remote Control Panel – Route Page





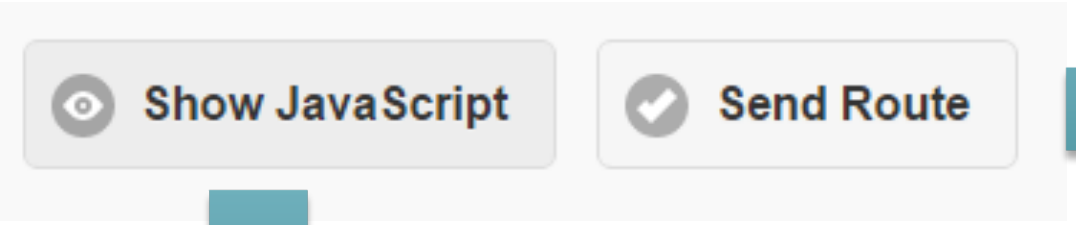
Remote Control Panel - Puzzle



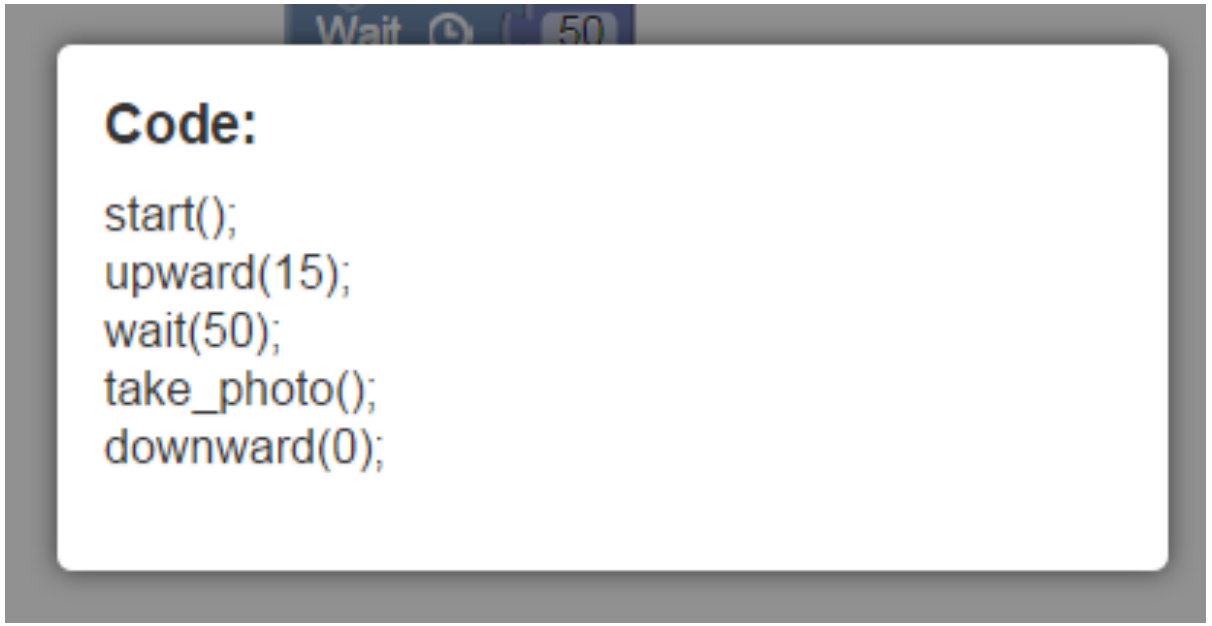
Remote Control Panel - Example

1. Start
2. Upward by 15 cm
3. Wait for 50 second
4. Take a photo
5. Downward by 0 cm
   (trigger Auto Landing Function)

Remote Control Panel



Commands are sent to Android Copter



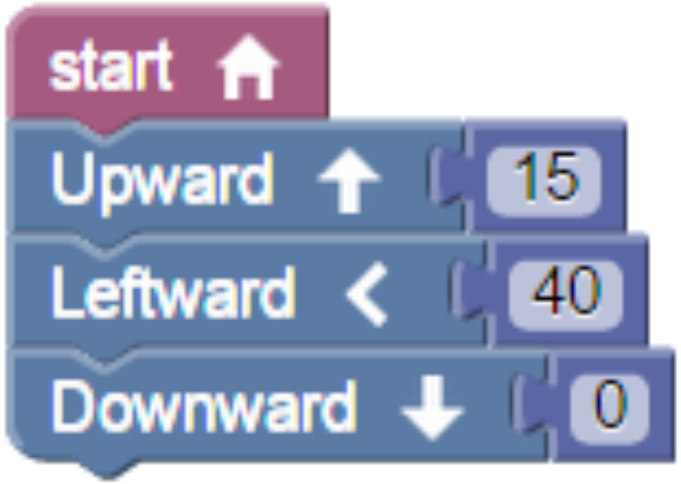
Demo

- http://leah.ddns.net/controller/

Demonstration – Go Left

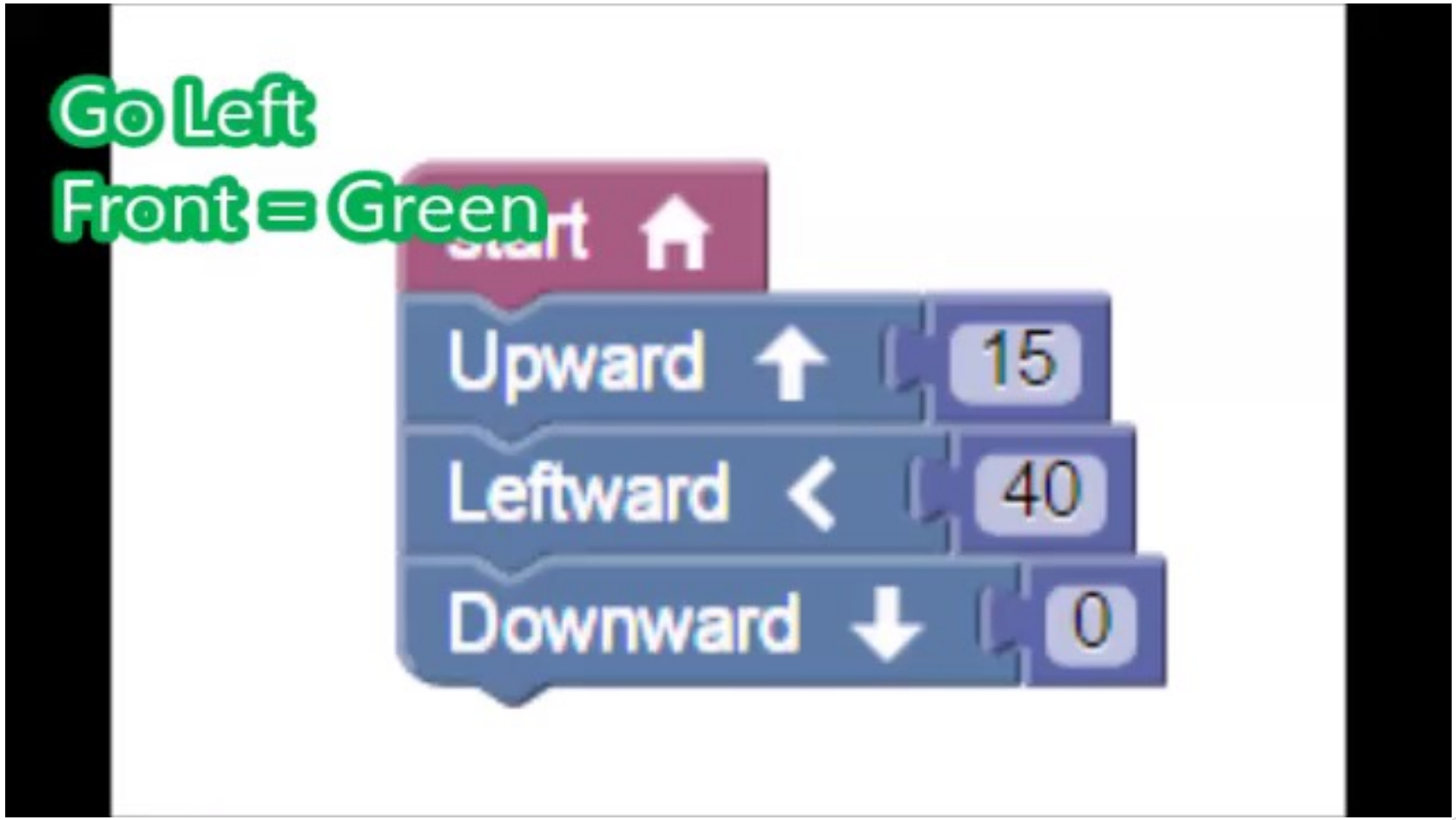
1. Start
2. Upward by 15 cm
3. Leftward by 40 cm
4. Downward by 0 cm

   (Trigger Auto Landing Function)



Demonstration – Go Left

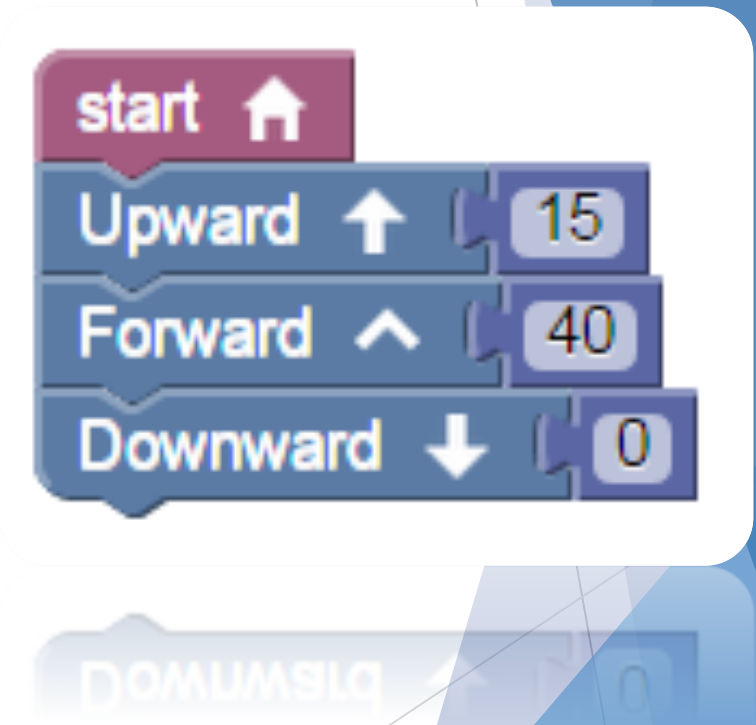
Demonstration – Go Left



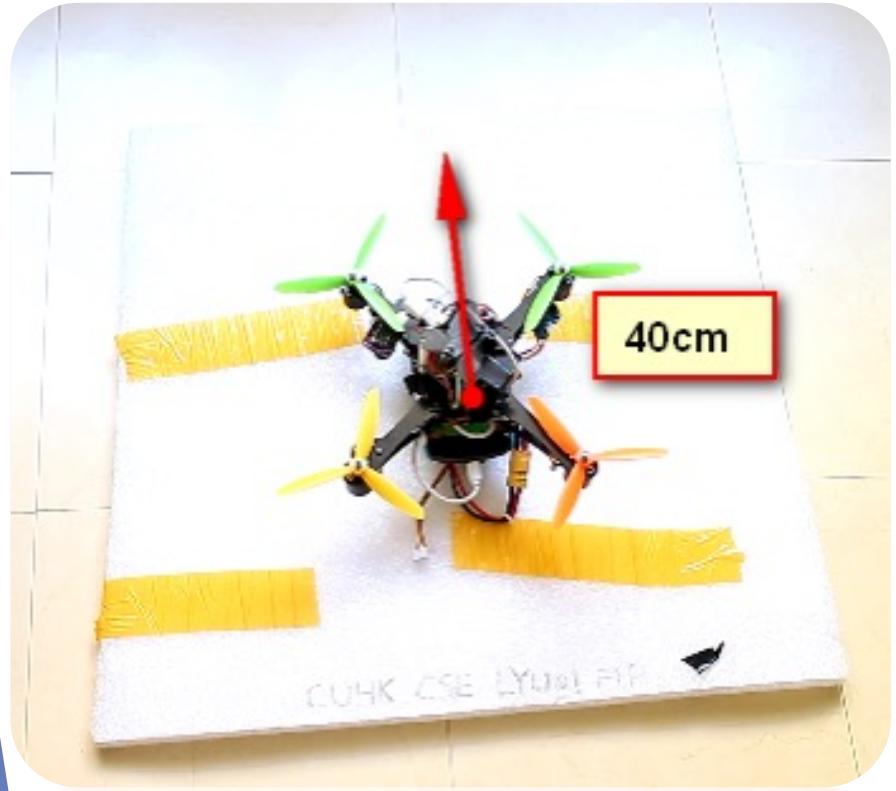
Demonstration – Forward

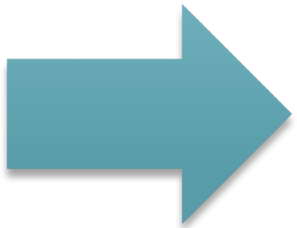
1. Start
2. Upward by 15 cm
3. Forward by 40 cm
4. Downward by 0 cm

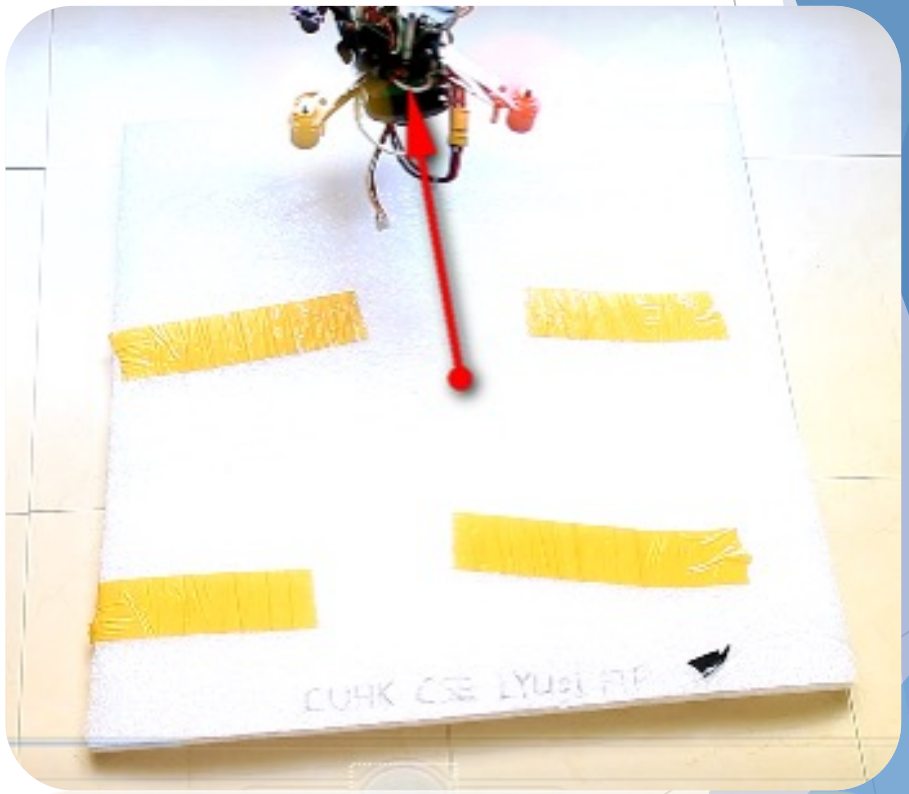
   (Trigger Auto Landing Function)



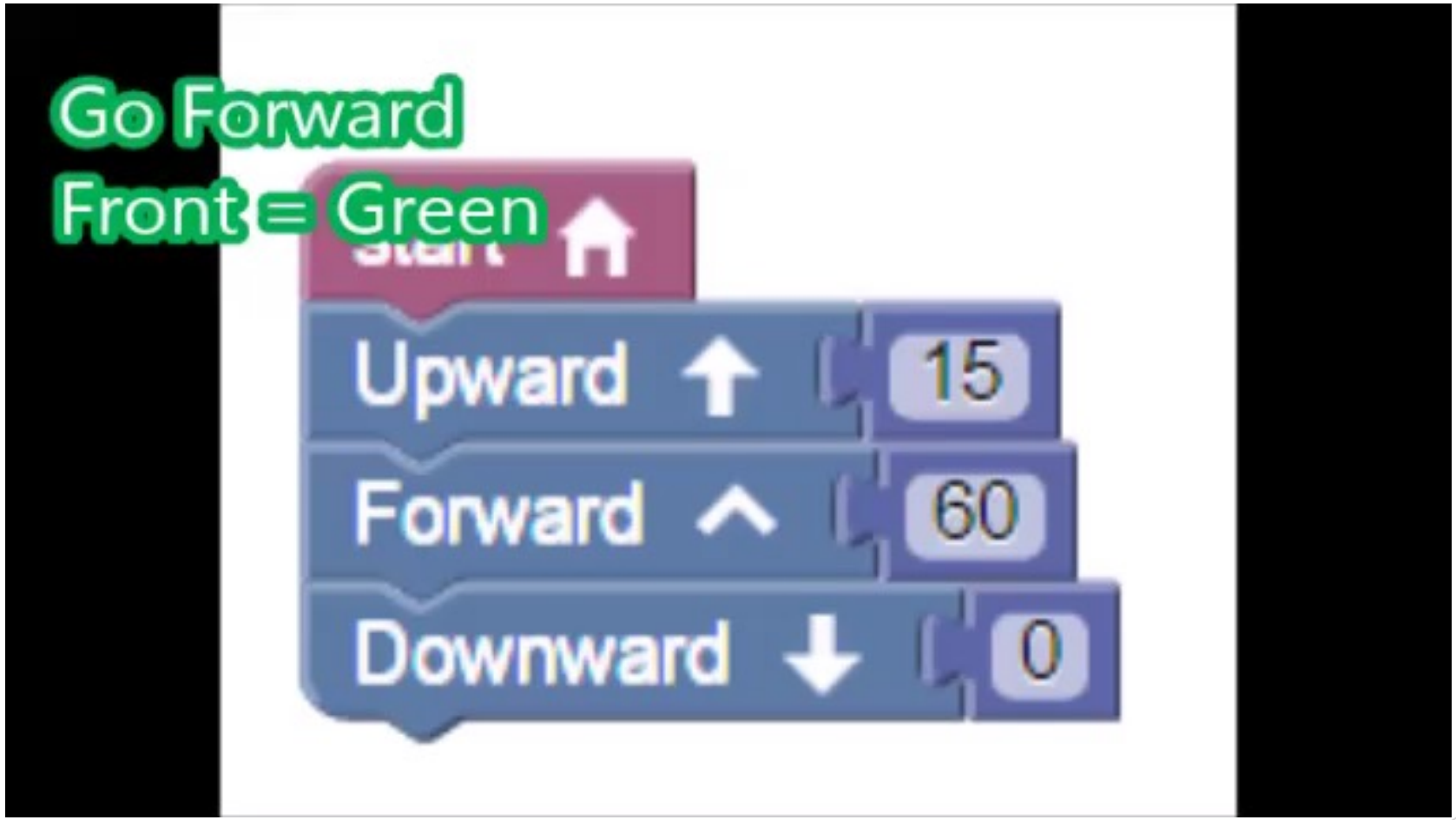
Demonstration – Forward







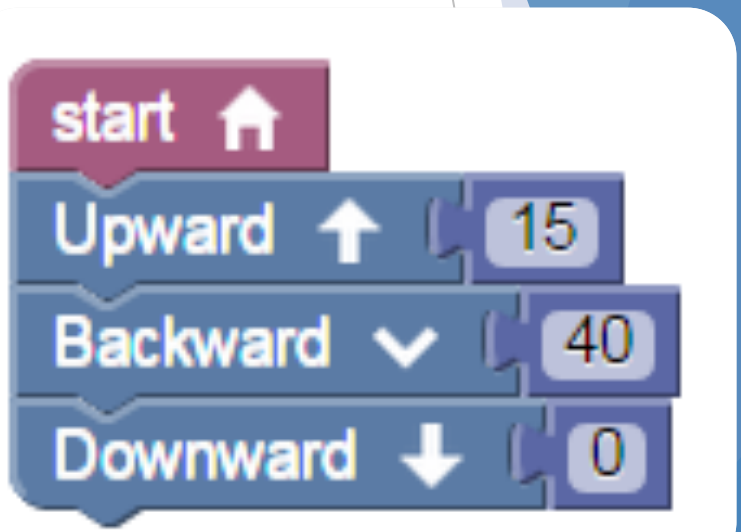
Demonstration – Forward



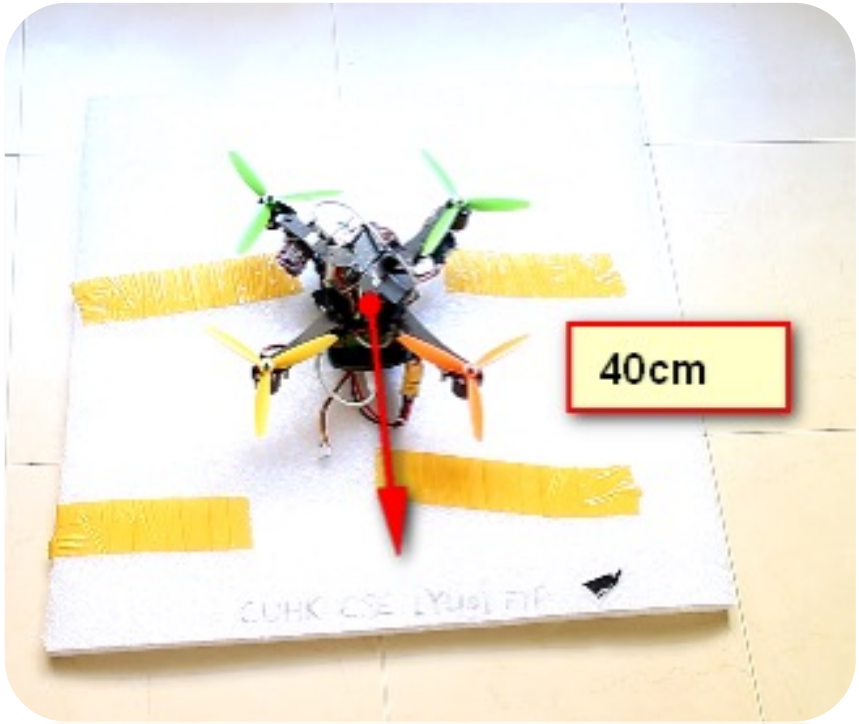
Demonstration – Backward

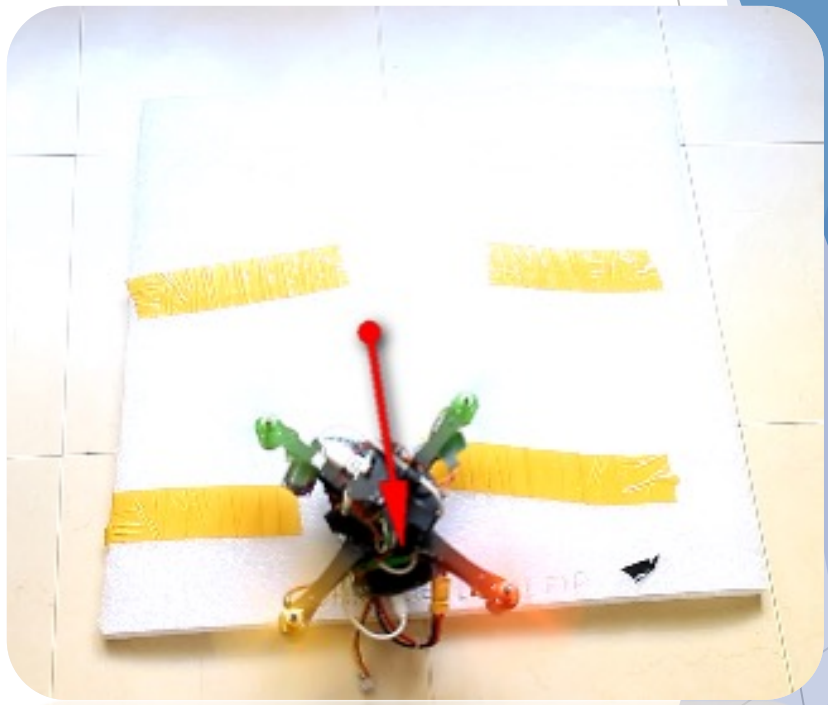
1. Start
2. Upward by 15 cm
3. Backward by 40 cm
4. Downward by 0 cm

   (Trigger Auto Landing Function)

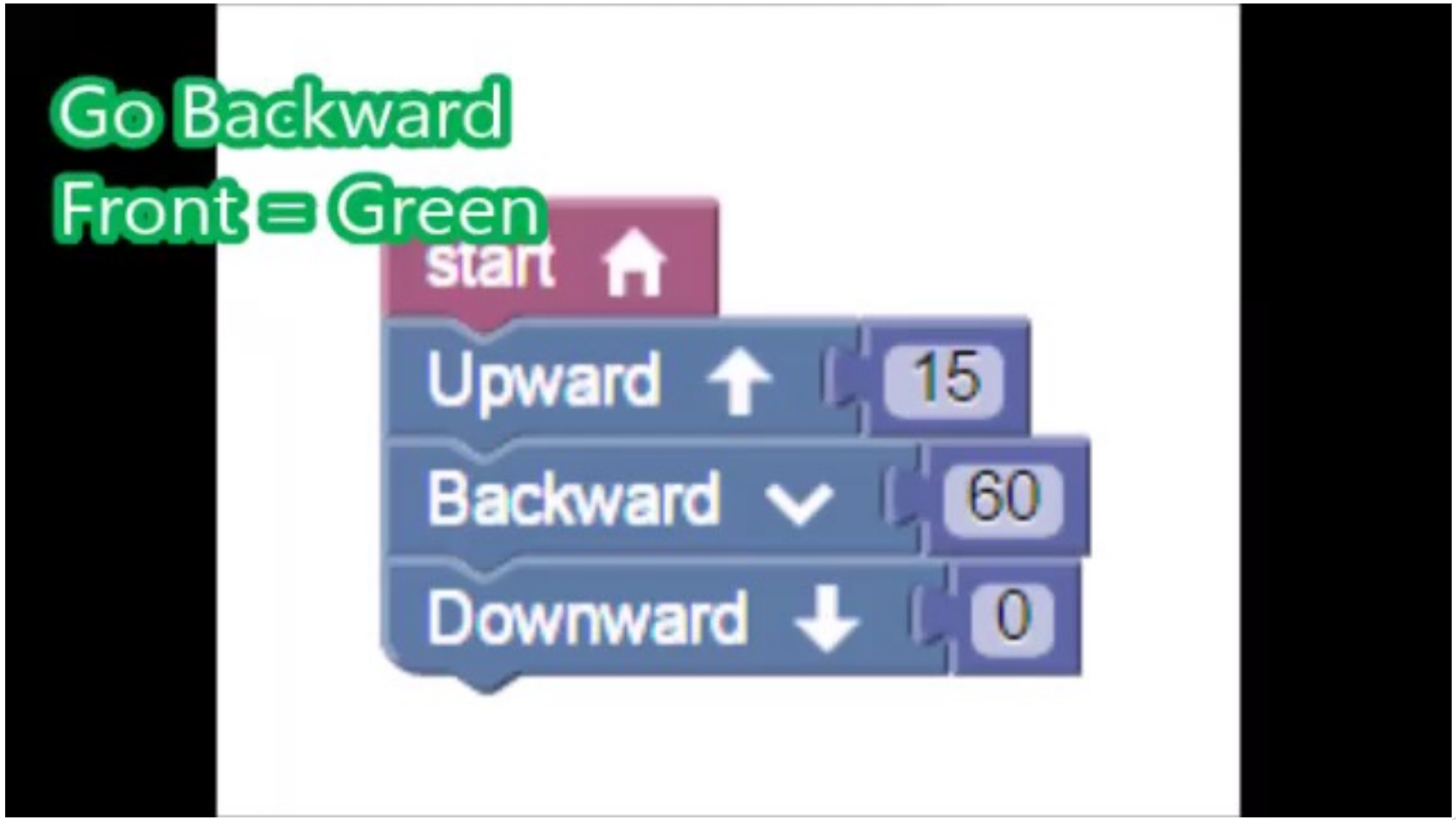


Demonstration – Backward





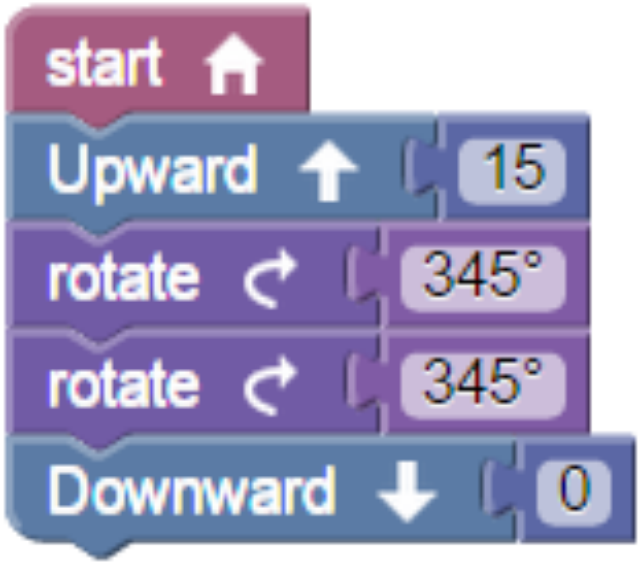
Demonstration – Backward



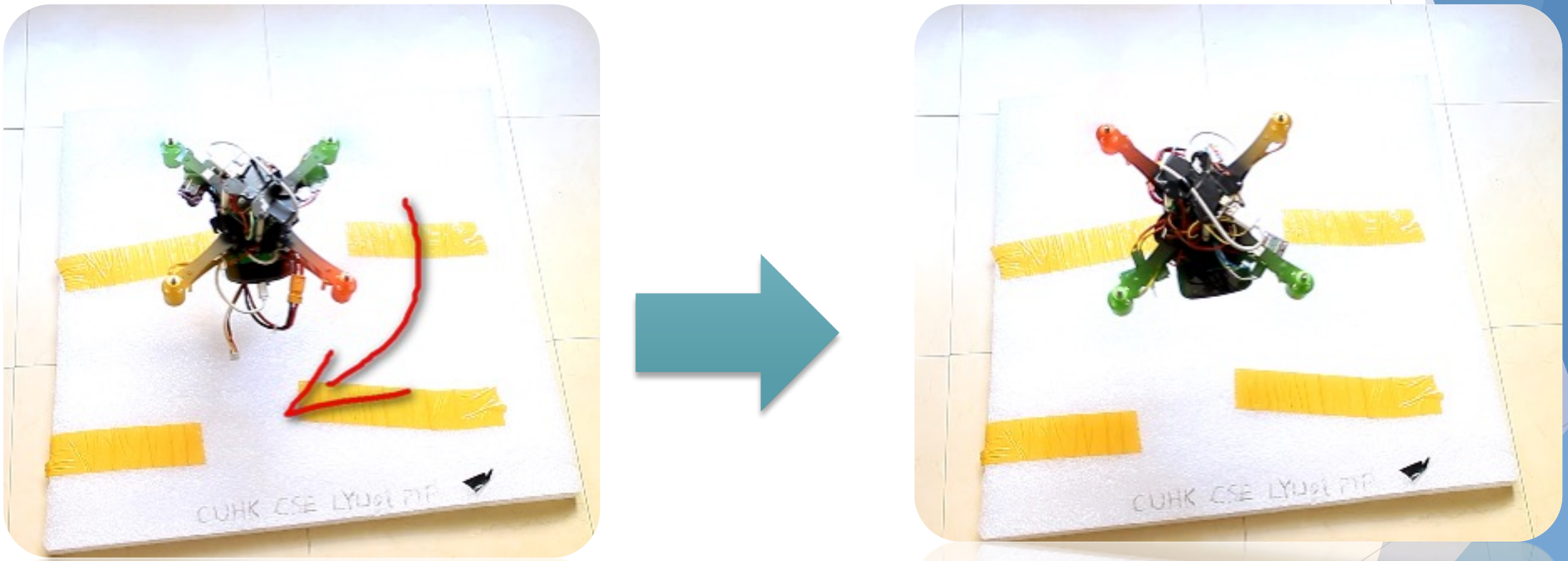
Demonstration – Rotation

1. Start
2. Upward by 15 cm
3. Rotate by 345 degree
4. Rotate by 345 degree
5. Downward by 0 cm

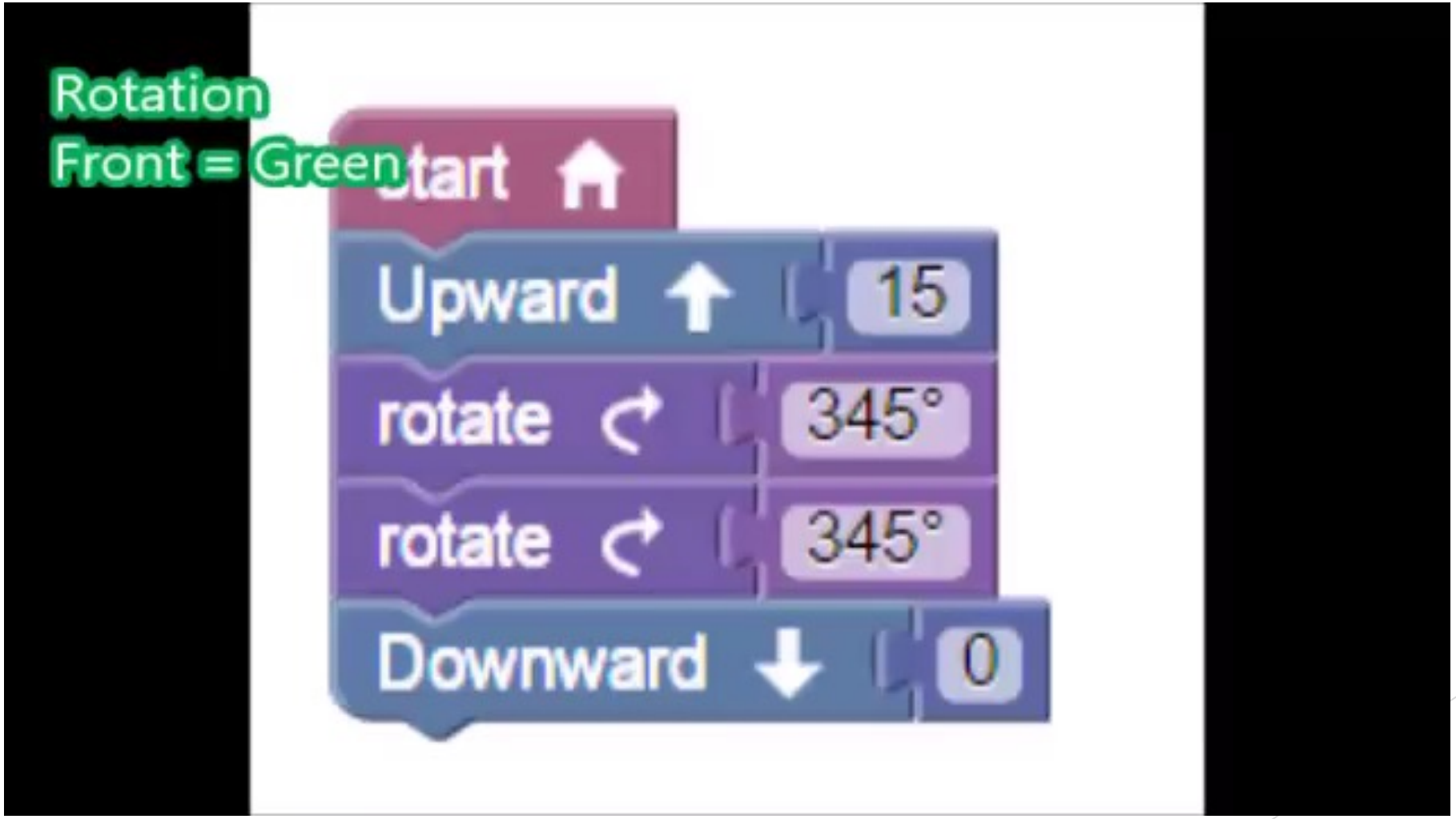
   (Trigger Auto Landing Function)



Demonstration – Rotation



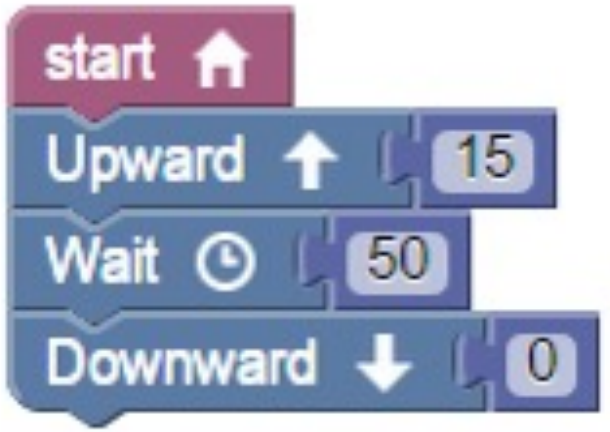
Demonstration – Rotation



Demonstration – Hovering

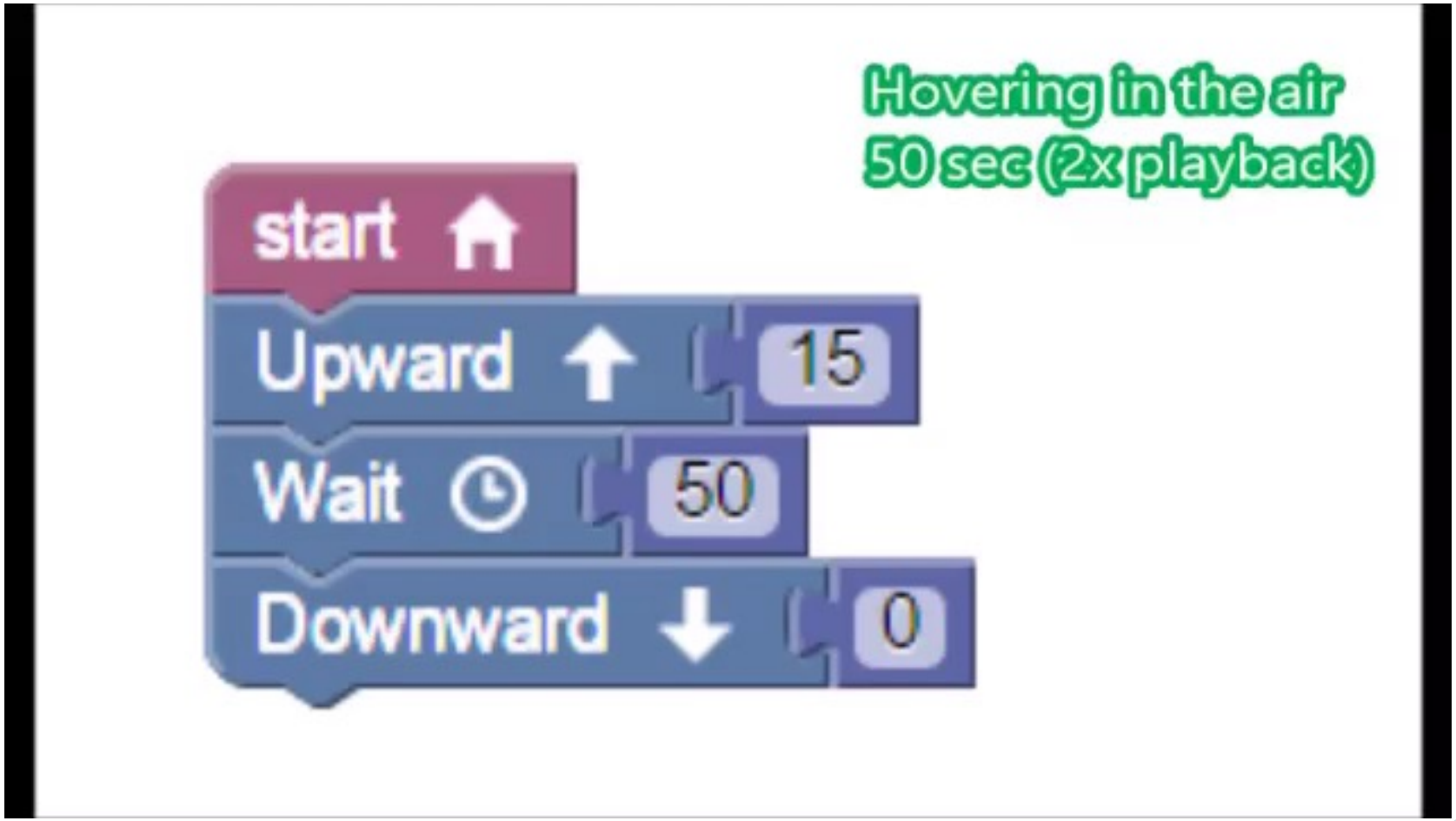
1. Start
2. Upward by 15 cm
3. Wait for 50 second
4. Downward by 0 cm

   (Trigger Auto Landing Function)



Demonstration – Hovering

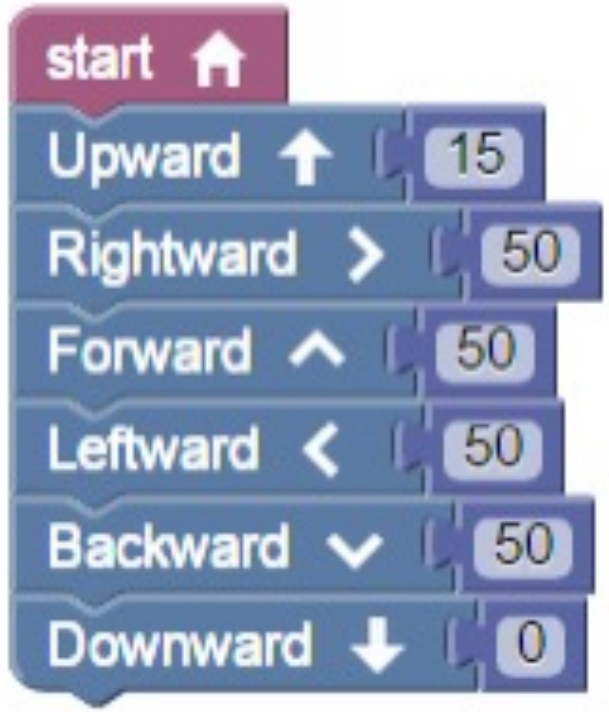
Demonstration – Hovering



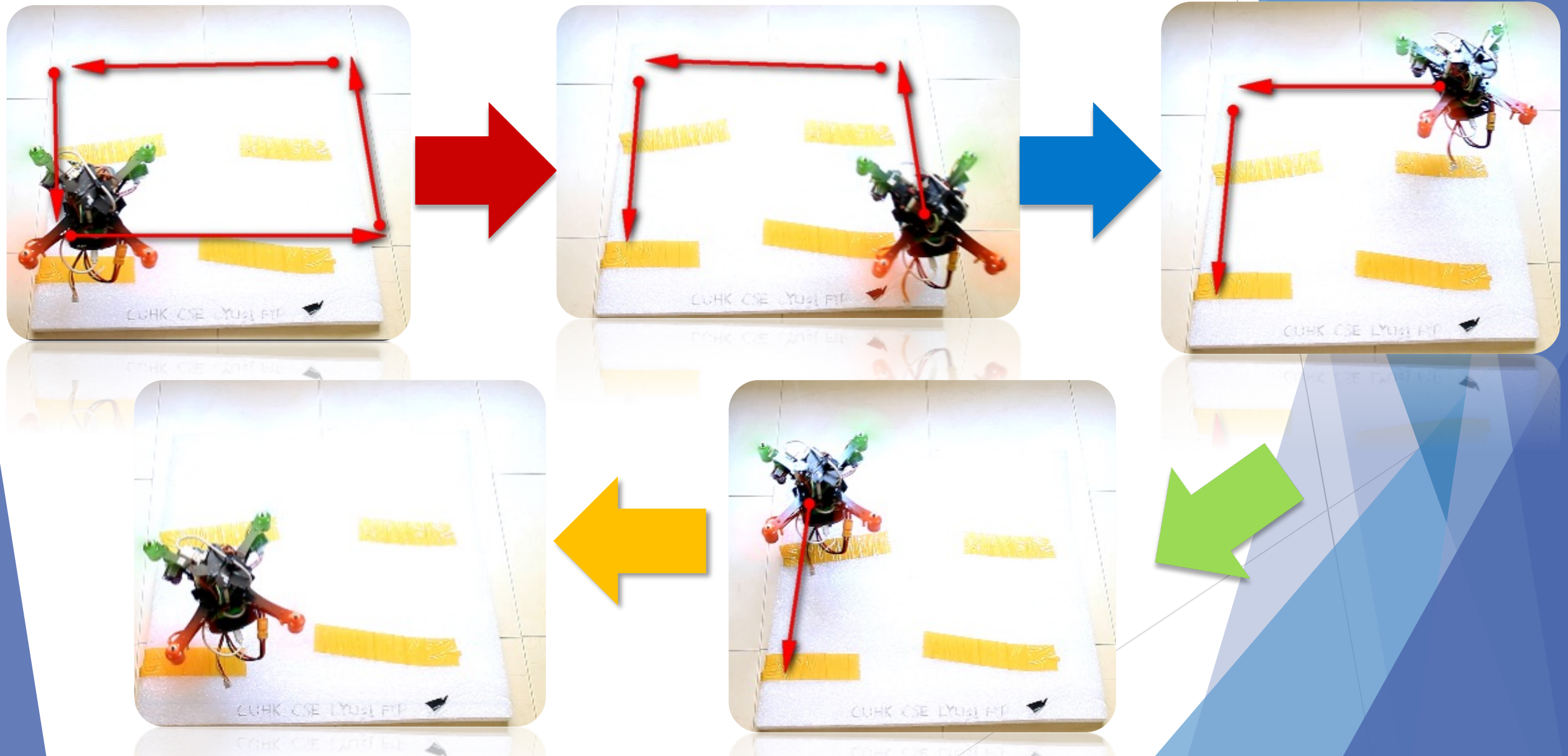
Demonstration – Rectangular Path

1. Start
2. Upward by 15 cm
3. Rightward by 50 cm
4. Forward by 50 cm
5. Leftward by 50 cm
6. Backward by 50 cm
7. Downward by 0 cm

   (Trigger Auto Landing Function)



Demonstration – Rectangular Path

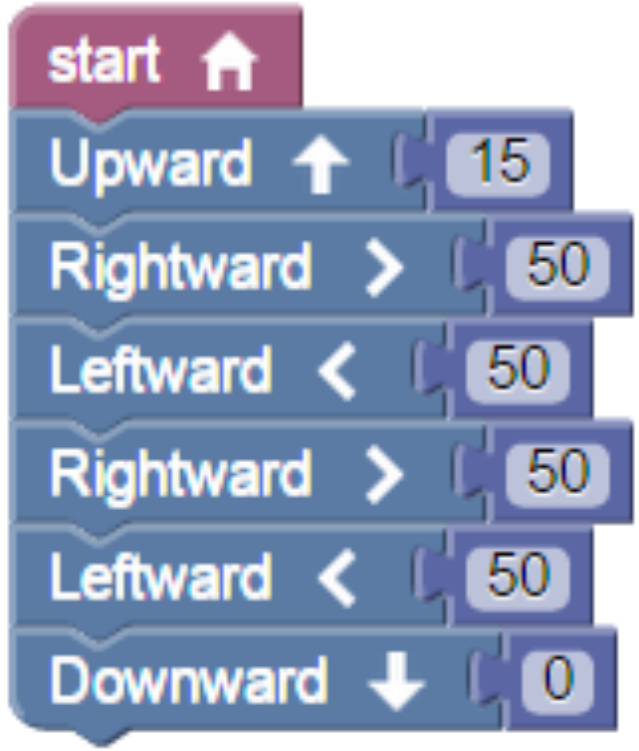


Demonstration – Rectangular Path

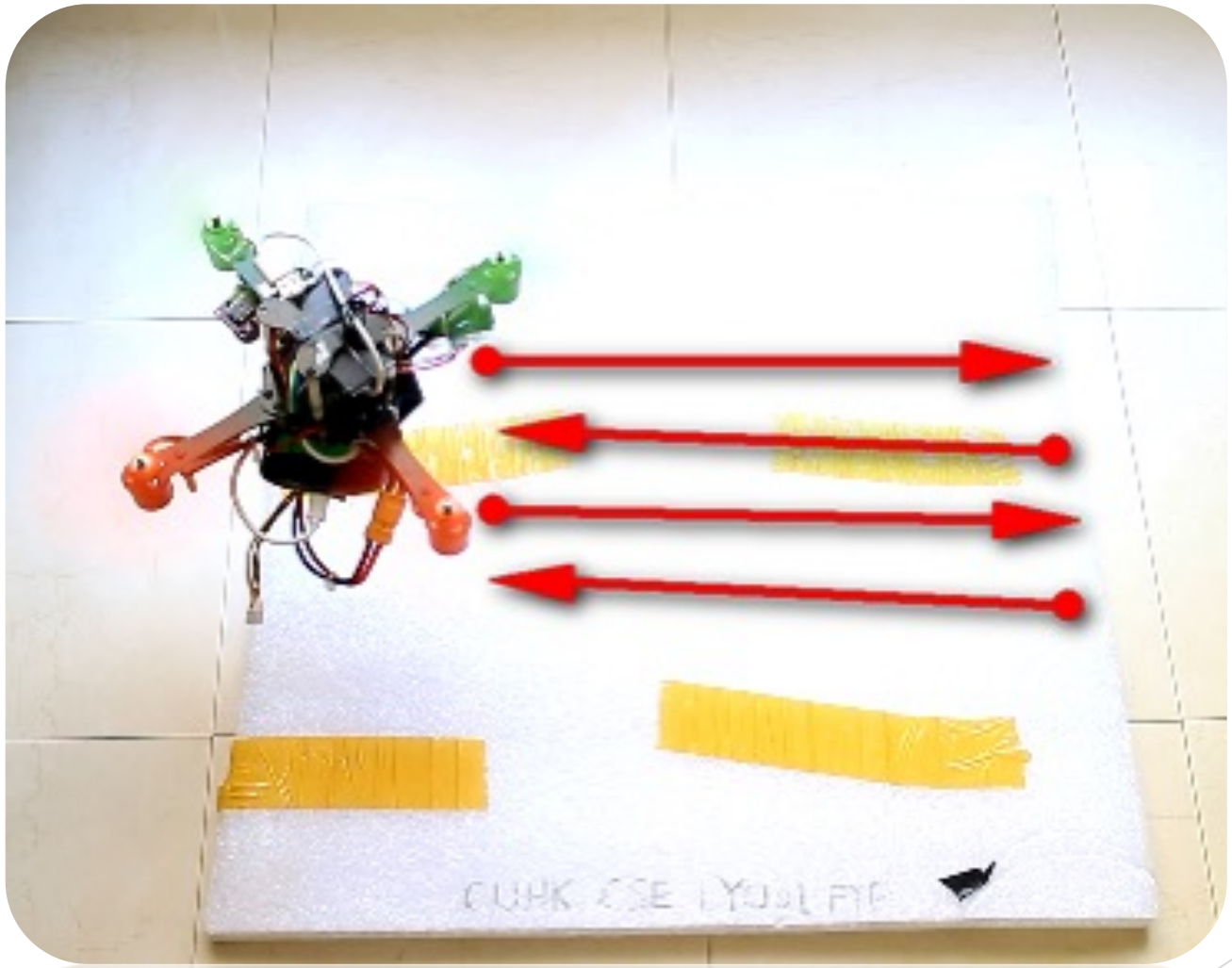
Demonstration – Right, left, right, left

1. Start
2. Upward by 15 cm
3. Rightward by 50 cm
4. Leftward by 50 cm
5. Rightward by 50 cm
6. Leftward by 50 cm
7. Downward by 0 cm

   (Trigger Auto Landing Function)

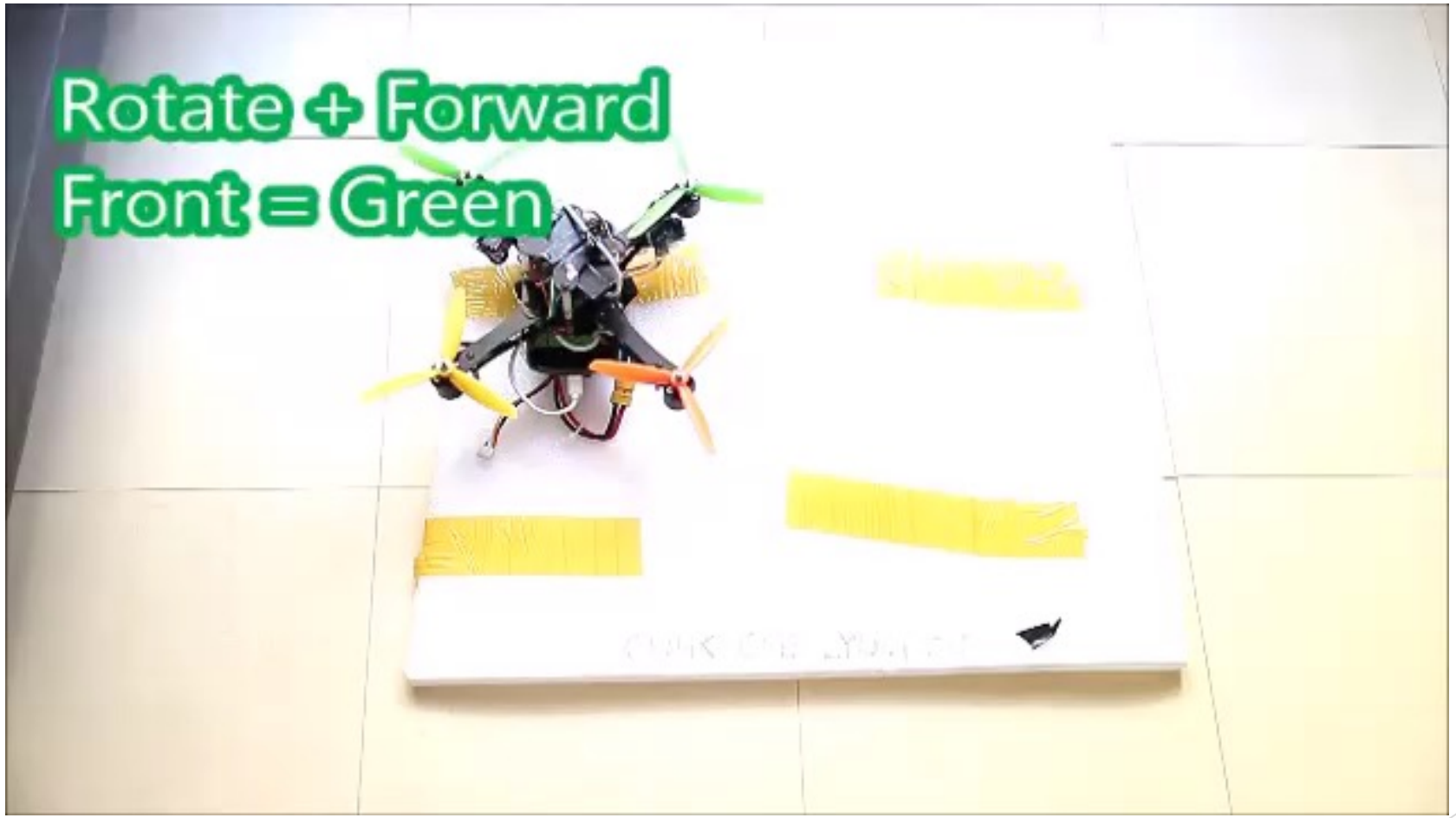


Demonstration – Right, left, right, left



Demonstration – Right, left, right, left

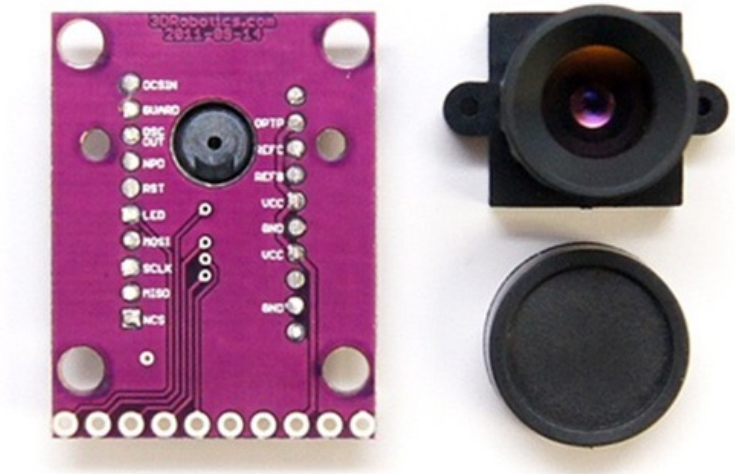
Demonstration – Rotate & Forward



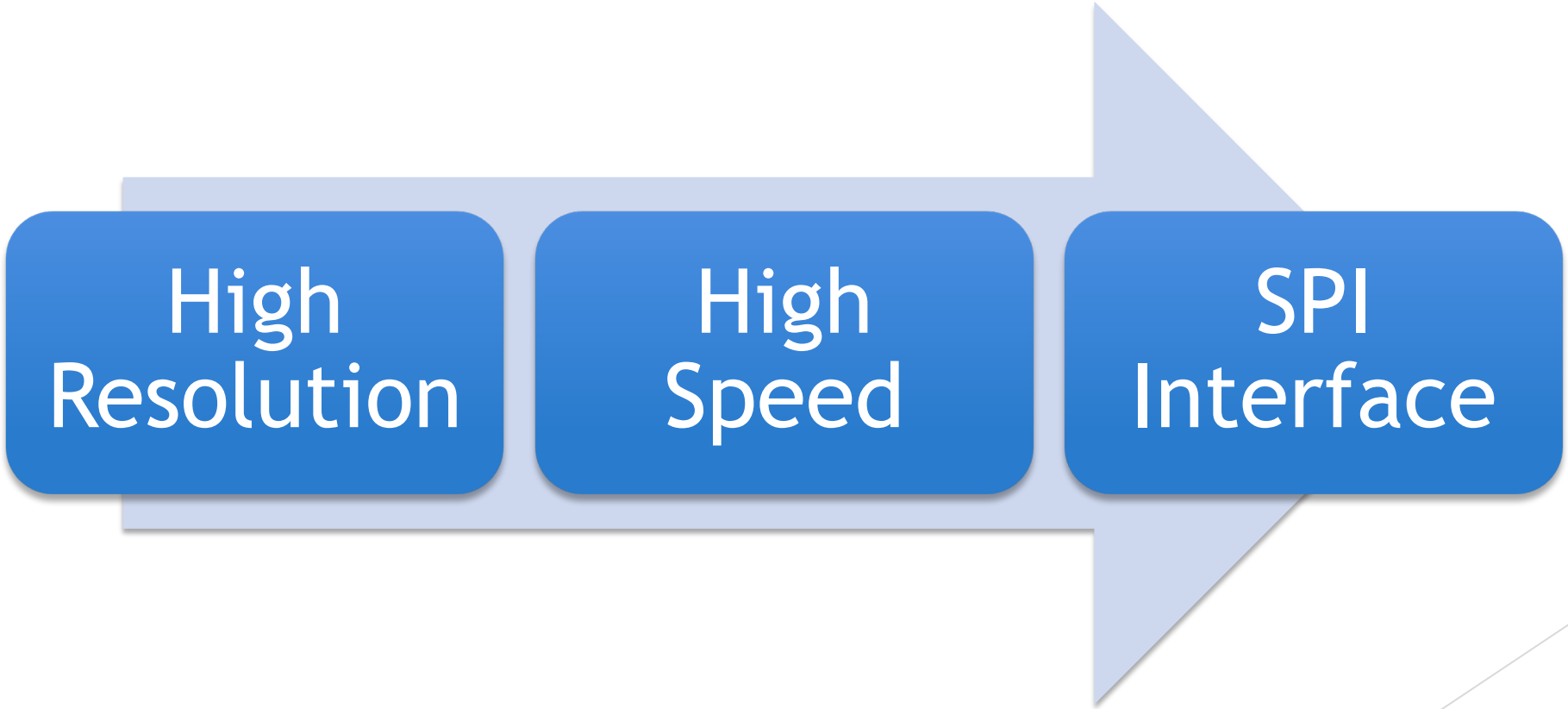
Demonstration – Camera Capture

What is Optical Flow Sensor?

- A mouse sensor
- A camera to make film capture



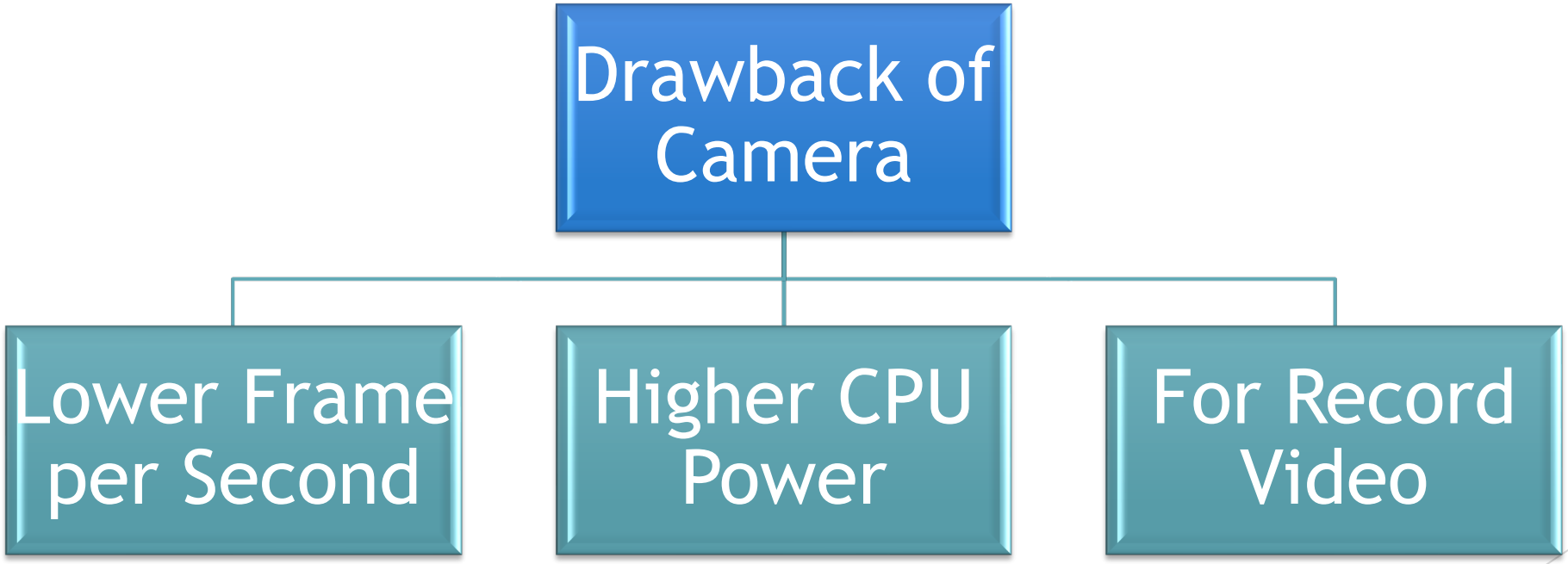
How the Optical Flow Sensor work?



Why Optical Flow Sensor is needed?

- Newton’s first law: a moving object will continue moving
- Optical Flow Sensor detects the movement to prevent the quadcopter move away.
- Accuracy: roughly 10cm
- GPS Accuracy: more than 100cm (outdoor only)

Why not use Camera instead of Optical Flow Sensor?

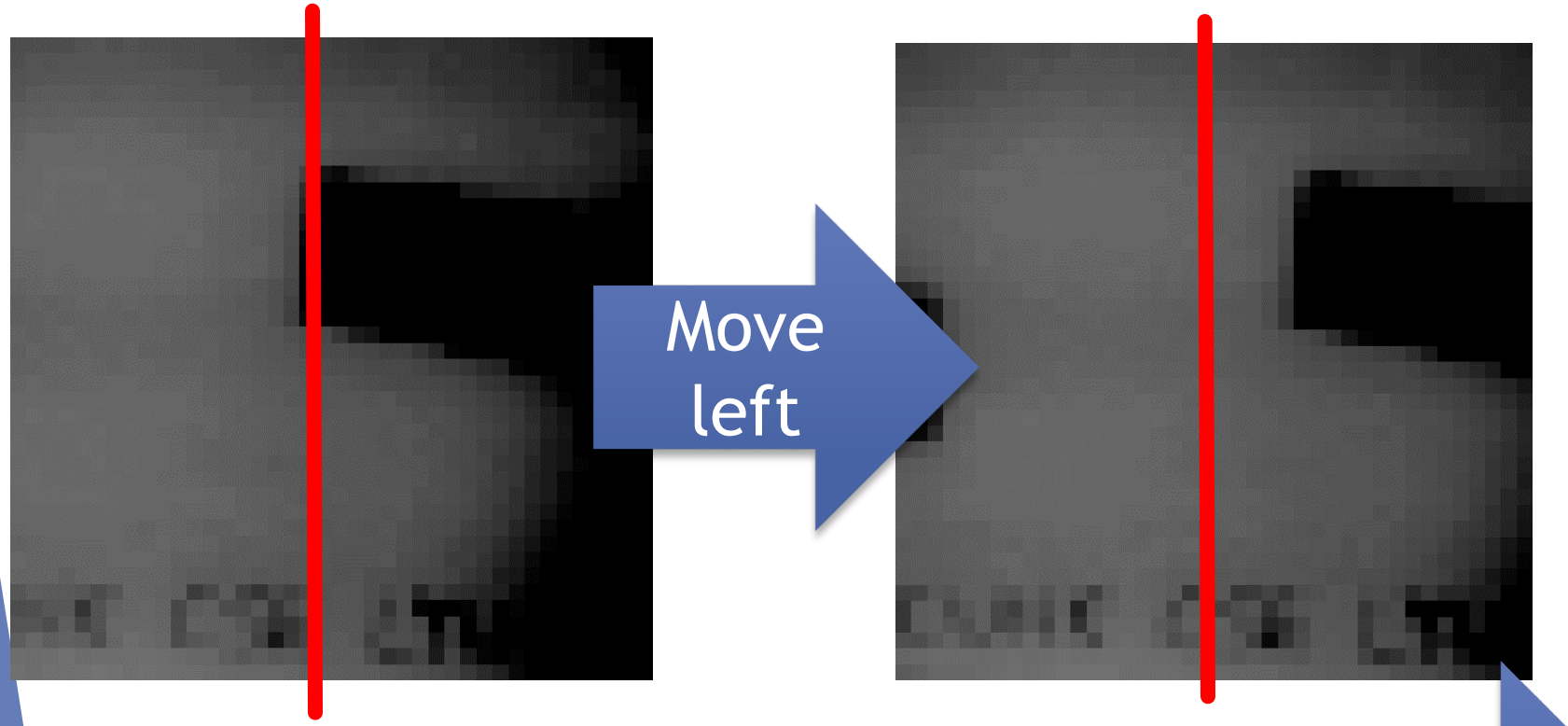


Usage in this Project

Improve the Stability

- Hovering in a fixed Point
- Path Tracking

Optical Flow Sensor – Example

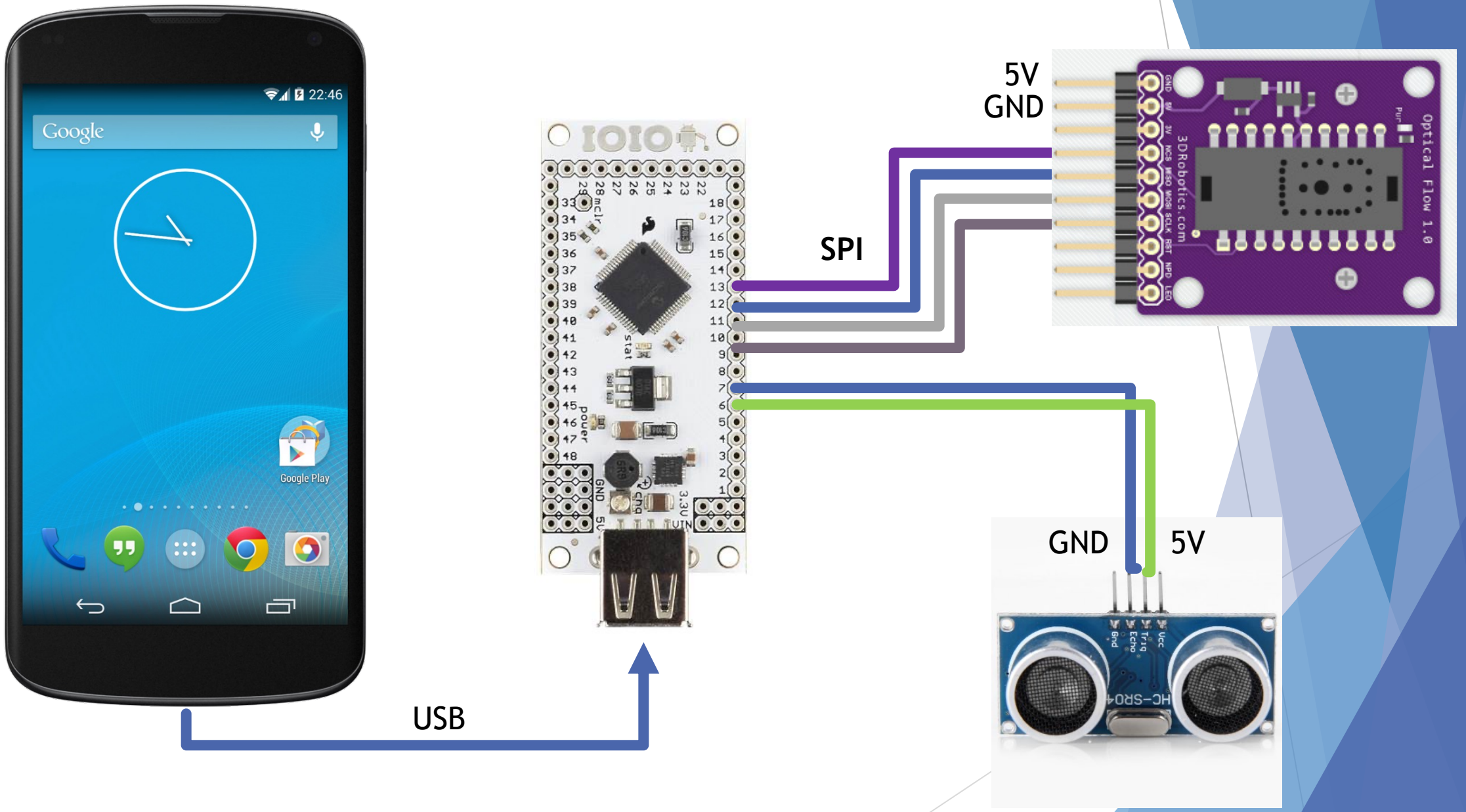


Move left

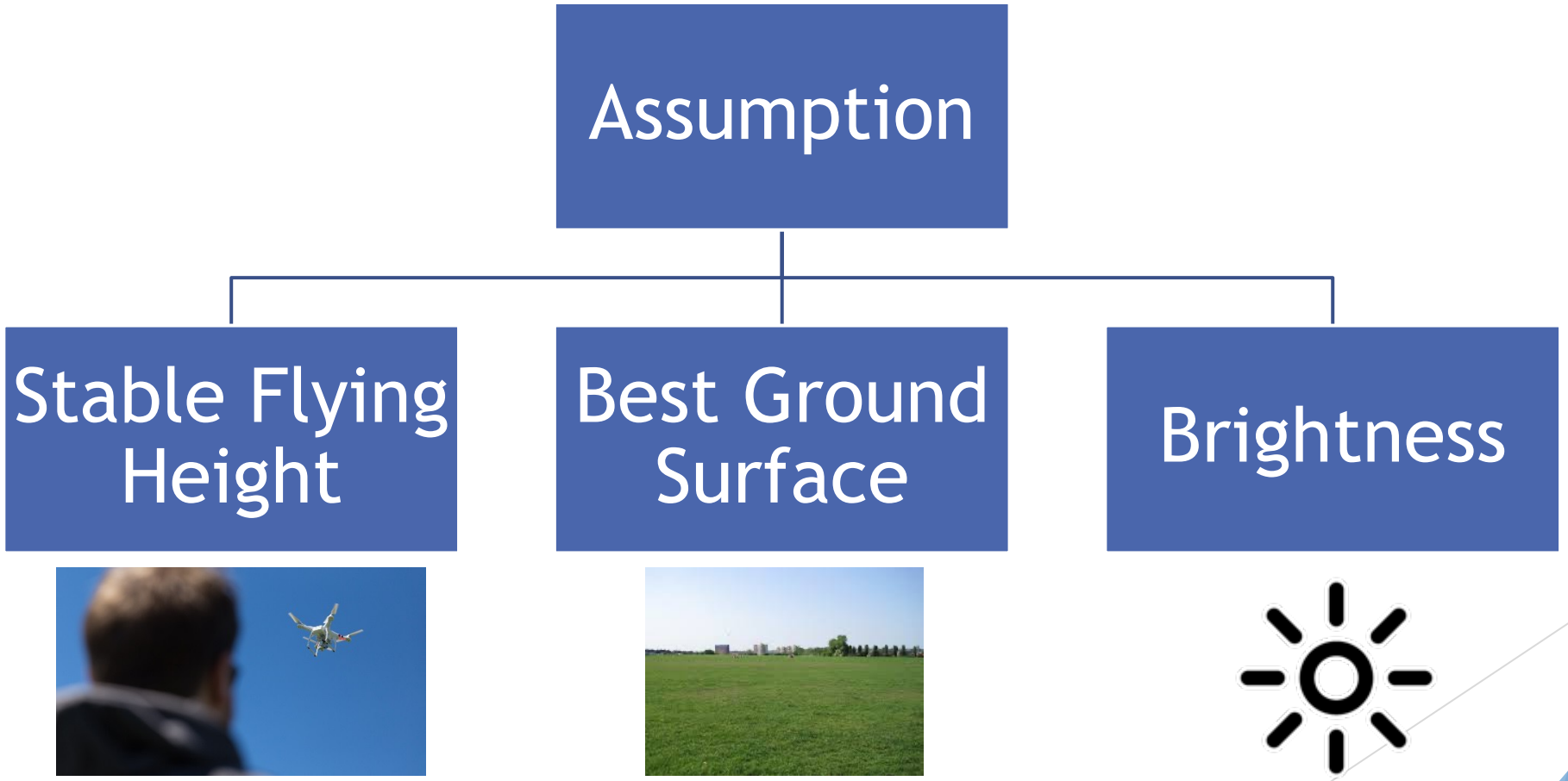
Movement of Objects

{delta x, y }

Sensors

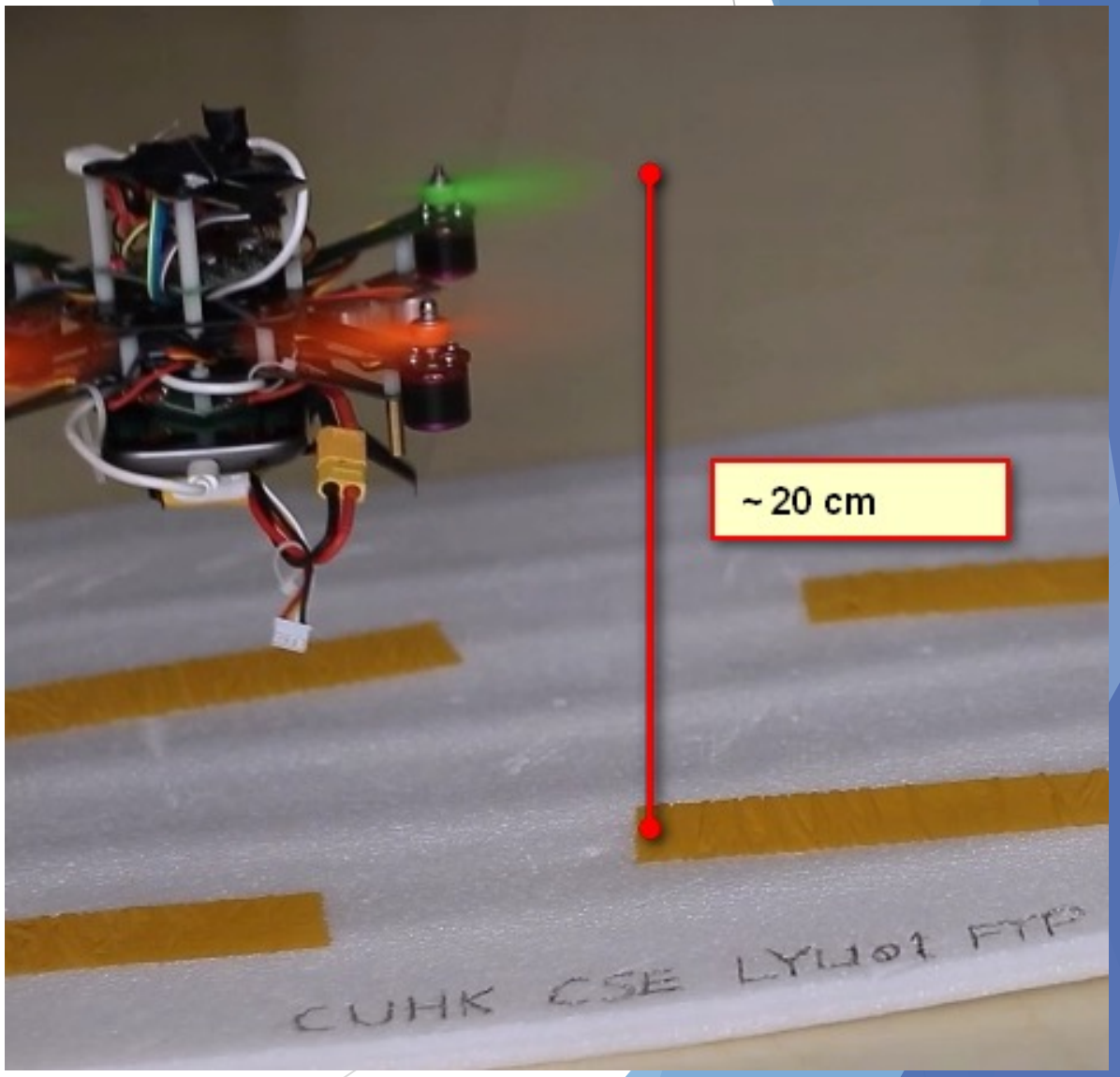

22:46
Google
Google Play
USB
SPI
5V
GND
Optical Flow 1.0
3DRobotics.com
GND
5V
Vcc
Trig
Echo
Gnd
HC-SR04

Assumption


Assumption
Stable Flying Height
Best Ground Surface
Brightness

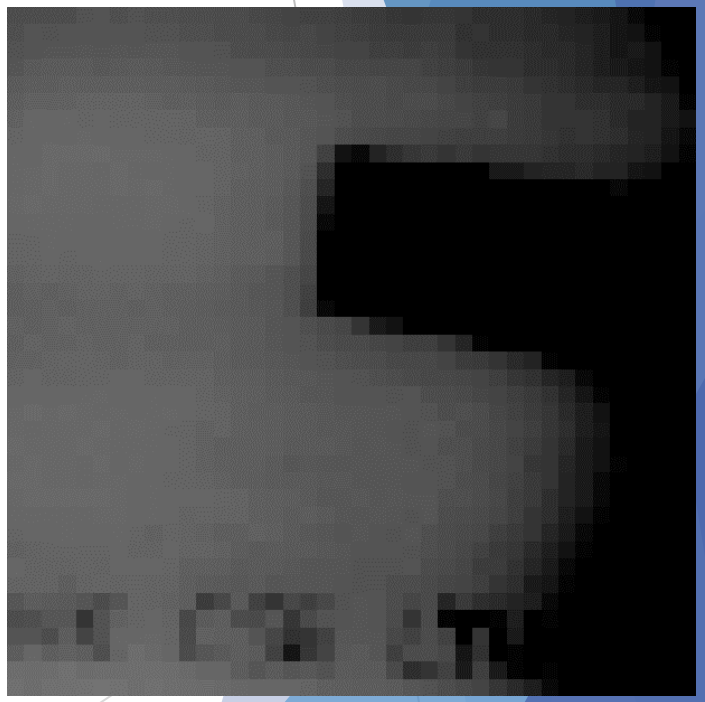
Assumption – Stable Flying Height

- 15 – 20 cm is preferred



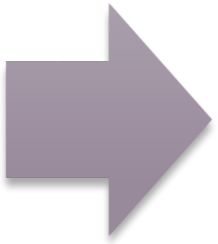
Assumption - Best Ground Surface

- Detailed surfaces with big objects



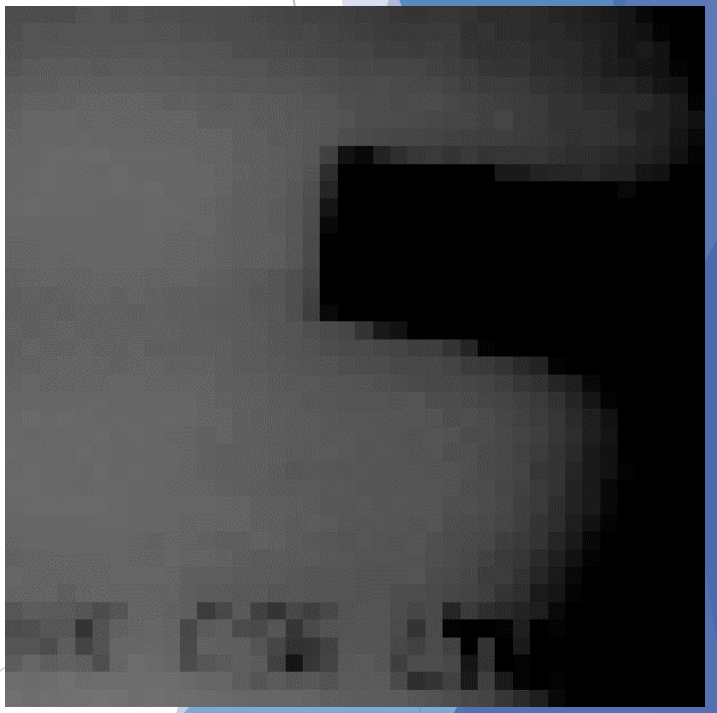
Assumption - Best Ground Surface

- Normal indoor ground
- Normal outdoor ground



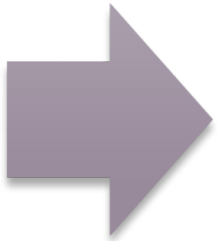
Assumption - Brightness

- Daylight



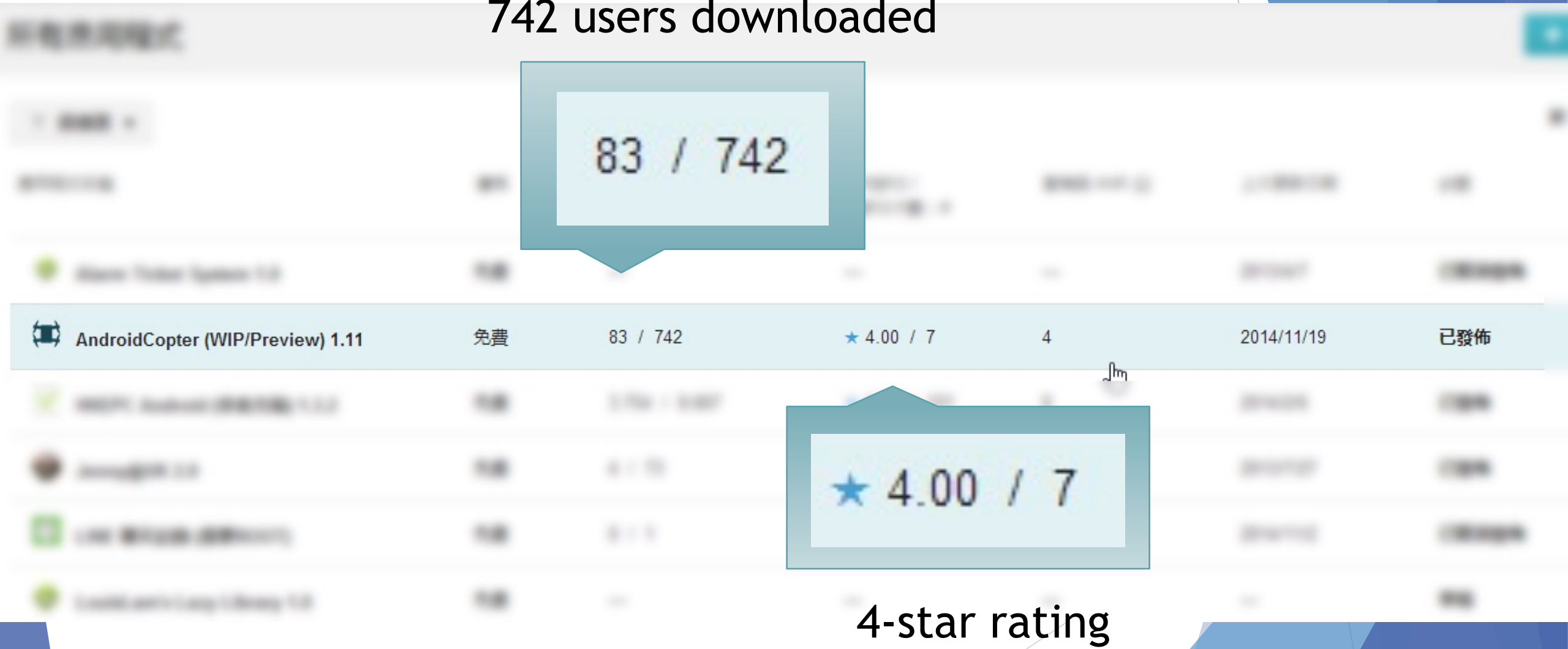
Assumption - Brightness

- Indoor light



Google Play

742 users downloaded



4-star rating

Future Development

- Application

Goods Delivery of Online Shopping Website

Photo Taking of Emergency Incidents

Security Guardians of Large Area

Future Development

- Use expensive hardware to improve the performance

Higher Resolution of camera

- Take Clearer Photo and Better Video

Higher Resolution of Optical Flow Sensor

- Achieve Better Stabilization

Conclusion

- Workable in current stage
- Depends on environments

  (Brightness, Ground Surface, Flying Height)

The End

- Thank you very much!

Data Flow Diagram

User

Visual programming

Remote Control Panel

Command

WebSocket Server

Command

Android Copter

Command Mechanism