Fabrication Of Drone && Control

2017

Supervised By

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A

Major Project Report on

Fabrication of a Drone And Control

Submitted to

Faculty of Computing and Information - Zagazig University

Department of Information Technology

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Under the Guidance of

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ABSTRACT

The quadcopter is a lightweight flying device that can be used for examining areas that would otherwise be hard to reach for a human. Many quadcopters are equipped with tools such as a GPS and automatically leveling cameras. It is important for us to stress the importance of science and technology to our students. Quadcopters give the kind of hands on application and real-world experience that students need. Quadcopters are not only fun to use in flying competitions; they can be used purposefully for real world applications. Observer Quad-copter, which is monitoring these natural disasters because of the need to portray some natural phenomena such as earthquakes, volcanoes and floods that, may lead to death of people who were filming these phenomena to find out the reasons for their occurrence. It also aims to identify people through the process of Face detection by high-quality camera.

The system should be a means of achieving justice, specifically by providing additional security. For individuals who could be in life or death situations. The team made it a goal to protect those who Protect and lead us. There are a lot of natural disasters which require imaging to determine the size of this disaster, Such as earthquakes, volcanoes and floods. There are lots of photographers are exposed to death during the filming of these disasters or landscape as in wildlife predators such as lions and tigers filming. There may be difficulties and problems in the control of a person by another person, such as the loss of the person who monitor.

KEYWORDS Drone/Quadcopter, Transmitter & Remote, Propellers, Electric Motors, Battery

Declaration

We hereby declare that the project entitled ***FABRICATION OF DRONE*** is the actual work carried out by us in the department of Information Technology under the guidance of:

DR. Osama ElKomy and DR. Amr M Abd Ellatif .

Hint:

We sent the idea of the project and its aim to the Academy of Scientific Research to support the graduation projects and we were chosen because of the importance and usefulness of this project in our time.

Academy of Scientific Research And Technology
أكاديمية البحث العلمي و التكنولوجيا

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2.1 Materials:

2.1.1 *Frame:*

Fig 2.3

Every quadcopter or other multirotor aircraft needs a frame to house all the other components. Things to consider here are weight, size, and materials. These are great quadcopter frames. They're strong, light, and have a sensible configuration including a built-in power distribution board (PDB) that allows for a clean and easy build. There are also a ton of spare parts and accessories available from many different websites. There are also a ton of clones out there, most of which include the same built-in

PDB and durable construction as the original. Parts and accessories are 100% compa ble and interchangeable.

2.1.2 Motors:

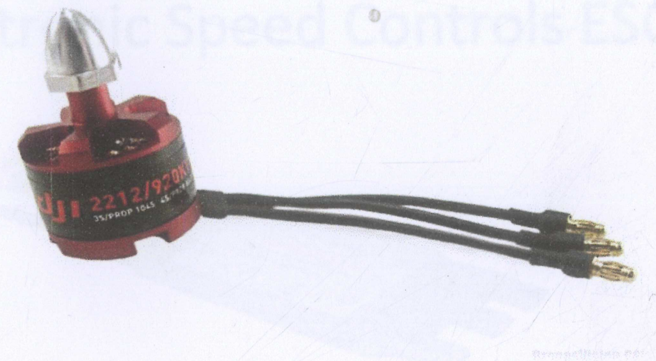


Fig 2.4

The motors have an obvious purpose: to spin the propellers. There are tons of motors on the market suitable for quadcopters, and usually you don't want to get the absolute cheapest motors available, but you also don't want to break the bank when some reasonably priced motors will suffice. Motors are rated by kilovolts, and the higher the kV rating, the faster the motor spins at a constant voltage. When purchasing motors, most websites will indicate how many amps the ESC you pair it with should be and the size of propeller you should use. We have found that a 920-kV motor is a good size to start with.

2.1.3 - Electronic Speed Controls ESC:

Fig 2.5

The electronic speed control, or ESC, is what tells the motors how fast to spin at any given time. You need four ESCs for a quadcopter, one connected to each motor. The ESCs are then connected directly to the battery through either a wiring harness or power distribution board. Many ESCs come with a built-in battery eliminator circuit (BEC), which allows you to power things like your flight control board and radio receiver without connecting them directly to the battery. Because the motors on a quadcopter must all spin at precise speeds to achieve accurate flight, the ESC is very important. These days if you are building a quadcopter or other multirotor, it is pretty much standard to use ESCs that have the SimonK firmware on them. This firmware changes the refresh rate of the ESC so the motors get many more instructions per second from the ESC, thus have greater control over the quadcopter's behavior. Many companies sell ESCs that have the SimonK firmware already installed.

2.1.4 - Ardupilot APM:

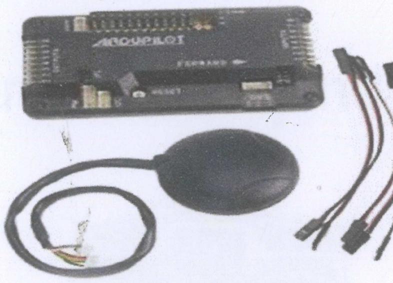


Fig 2.6

The flight control board is the 'brain' of the quadcopter. It houses the sensors such as gyroscopes and accelerometers that determine how fast each of the quadcopter's motors spin. Flight control boards range from simple to highly complex. A great flight control board for first time quadcopter builders are the Hobby King KK2.0. It is affordable, easy to set up, and has strong functionality. It can handle just about any type of multirotor aircraft so if you later want to upgrade to a hexacopter or experiment with a tricopter, you won't need to purchase another board.

For builders of quadcopters, choosing a flight controller is more of a personal choice in many ways, not unlike choosing from various PC processors in the same power range. Each have various options that each manufacturer wants and may or may not be customizable. If this is something that needs to be fixed, start reading the forums and listen to hobbyists who recommend affordable, reliable controllers which work with most components easily.

2.1.5 - Radio transmitter and receiver:

Fig 2.7

The radio transmitter and receiver allow you to control the quadcopter. There are many suitable models available, but you will need at least four channels for a basic quadcopter with the KK2.0 control board.

We recommend using a radio with 8 channels, so there is more flexibility for later projects that may require more channels. The Turnigy 9x is a great choice for a first radio. It's inexpensive yet still has some advanced func onality. There is also a large community of 9x users out there, so troubleshooting is easier.

2.1.6 - Propellers:

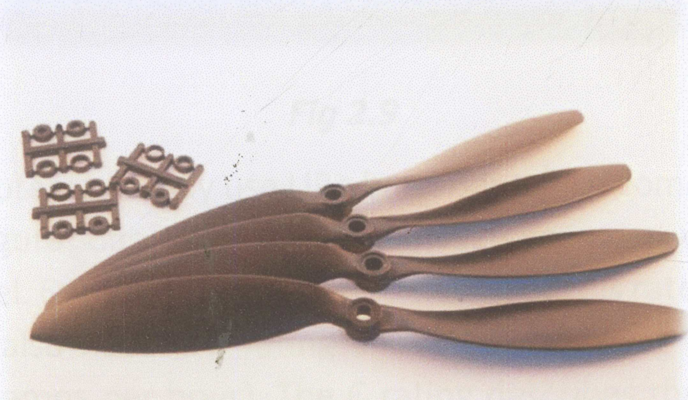


Fig 2.8

A quadcopter has four propellers, two "normal" propellers that spin counter-clockwise, and two "pusher" propellers that spin clockwise. The pusher propellers will usually be labeled with an 'R' after the size. For the quadcopter configuration in this post, we're using 9×4.7 props. This is a good size for the motors and ESCs we're using.

2.1.7 - Battery & Charger:

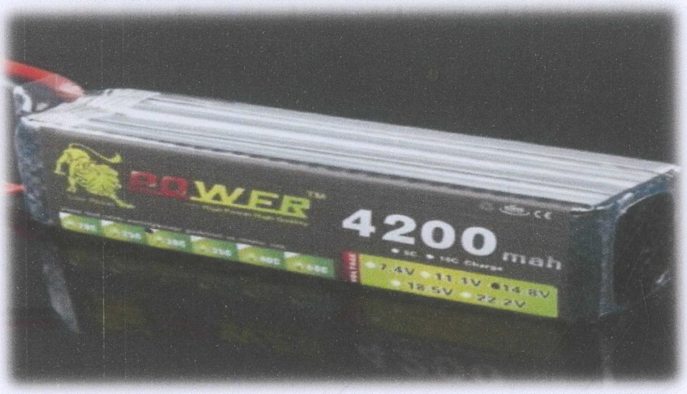


Fig 2.9

Quadcopters typically use LiPo batteries which come in a variety of sizes and con gura ons. We typically use 3S1P ba eries, which indicates 3 cells in parallel. Each cell is 3.7 volts, so this ba ery is rated at 11.1 volts. LiPo batteries also have a C rating and a power rating in mAh (which stands for milliamps per hour). The C rating describes the rate at which power can be drawn from the battery, and the power rating describes how much power the battery can supply. Larger batteries weigh more so there is always a tradeoff between flight duration and total weight.

2.1.8 - Battery Charger:

Fig 2.10

Charging LiPo is a complex process, because there are usually multiple cells within the battery that must be charged and discharged at the same rate. Therefore, you must have a balance charger. There are many chargers on the market that will do the job, but be careful of cheap or off-brand chargers as many of them have faulty components and can cause explosions or fires.

2.1.9 - controller board:

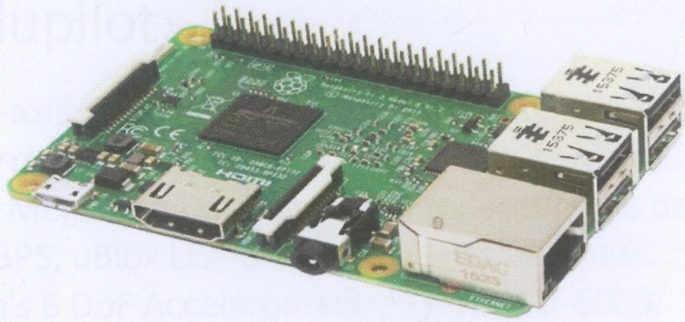


Fig 2.11

Raspberry Pi is a super powerful and popular new computer board, like Arduino but with a much faster processor and built-in video. It's not really designed for "physical computing" with lots of I/O like Arduino, and it's not open hardware so you can't make a version optimized for any task, so it's not a natural candidate for an autopilot. (It also runs Linux). work with the Raspberry Pi board and got a quadcopter to fly.

2.3 Methodology Adopted for Assembling of a Drone:

Working Principle:

1. First, we are making a frame of light weight material.

2. Quadcopter is a device with an intense mixture of Electronics, Mechanical and mainly on the principle of Aviation.

3. The Quadcopter has 4 motors whose speed of rota on and the direc on of rota on changes according to the users desire to move the device in a direction (i.e. Takeoff motion, Landing motion, Forward motion, Backward motion, Left motion, Right Motion.)

4. The rota on of Motors changes as per the transmi ed signal send from the 6-Channel transmitter.

5. The signal from microcontroller goes to ESC's which in turn control the speed of motor

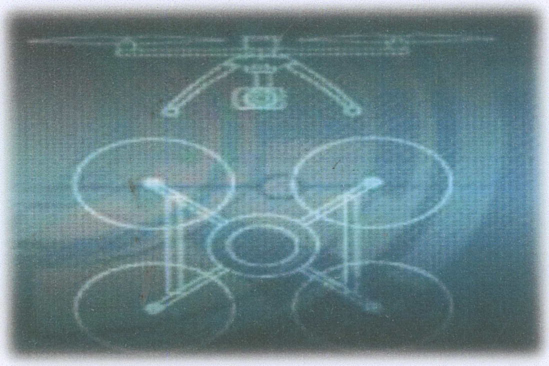


Fig 2.12 **Sketch Design of a Quadcopter**

This chapter introduces some of the main concepts and background knowledge related to this project. A generic model of a quadcopter (Fig. 2.12) will be introduced, as well as methods of connecting masses to UAVs and an introduction to controller actions.

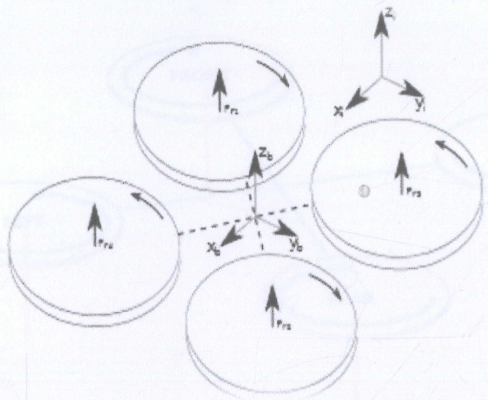


Fig 2.13 Axis of a Drone

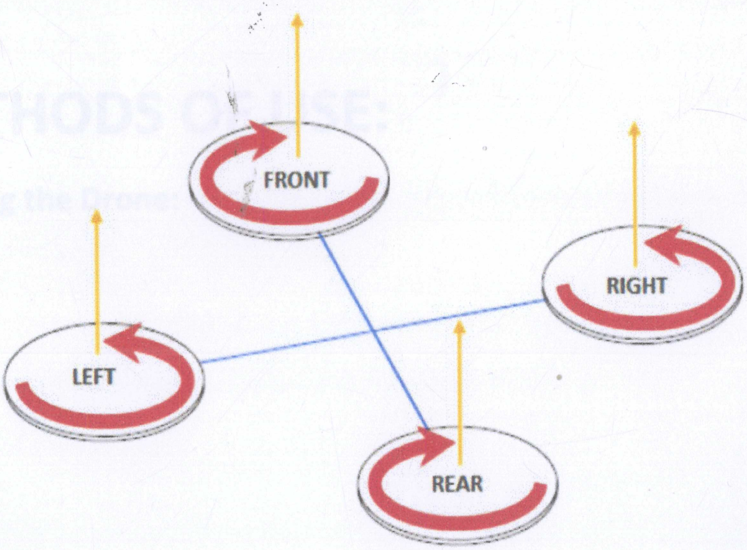


Fig 2.14 Take Off Motion

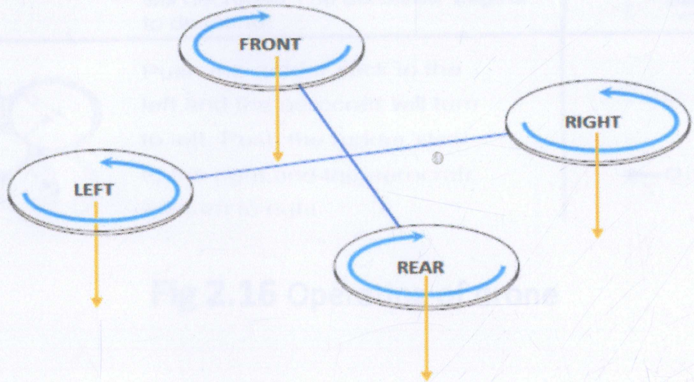


Fig 2.15 Landing Motion

2.4 METHODS OF USE:

2.4.1 Opera ng the Drone:

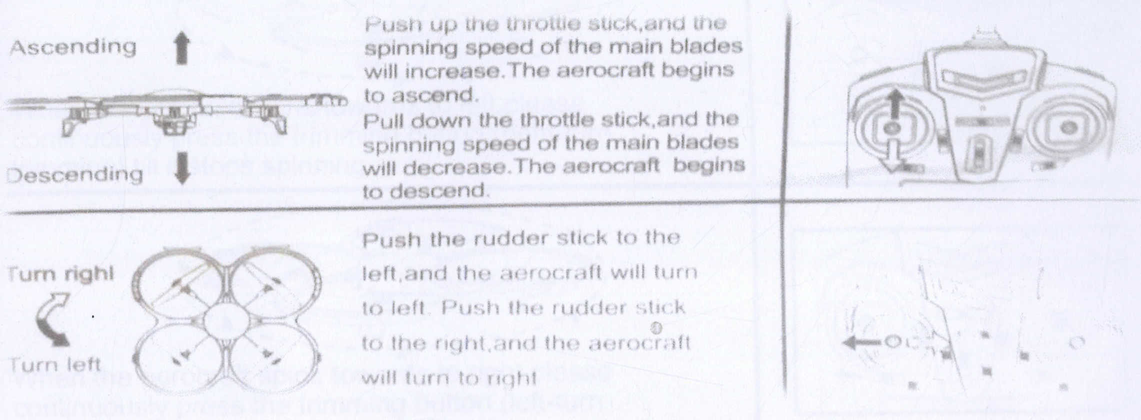


Fig 2.16 Operating of drone

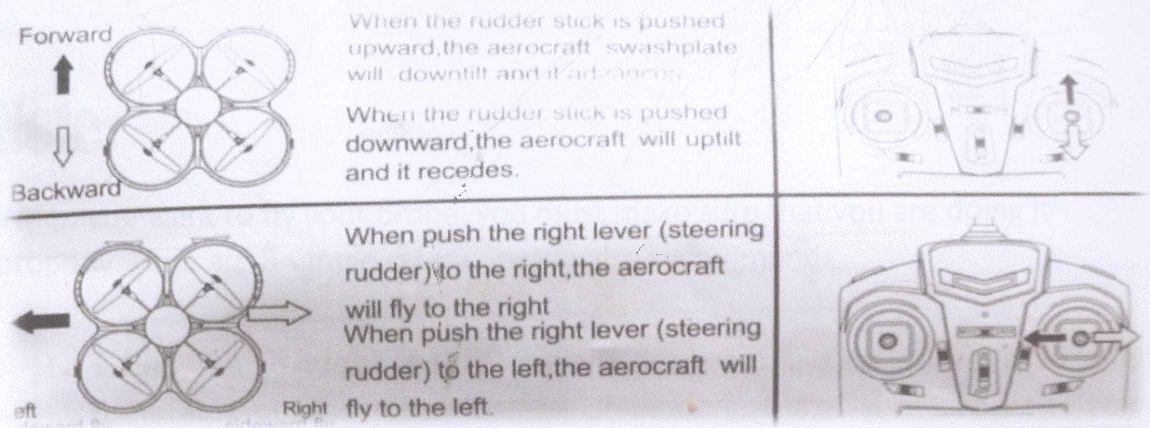


Fig 2.17 Operating of drone

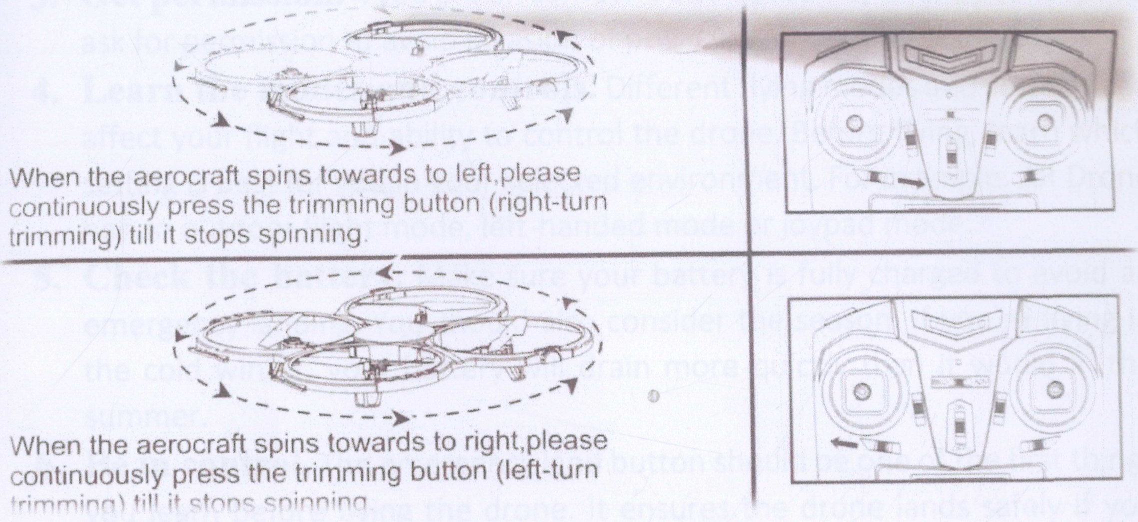


Fig 2.18 Operating of drone

Note:

When you want to fly your drone, you must make sure that you are doing it properly. Here are 8 simple safety ps we also recommend:

1. **Choose the right environment**. First, try flying a drone in an open, preferably outdoor area instead of indoors. Make sure the day you've selected is relatively wind free and the location has few trees – because no one wants emergency drone landing 15 feet up in a tree.
2. **Be aware of your surroundings**. Take note of where other people, objects, trees or roads are to assure a safe flight path and landing. Don't fly near an airport or over a large group of people. Be aware of powerful antennas and power lines as well.

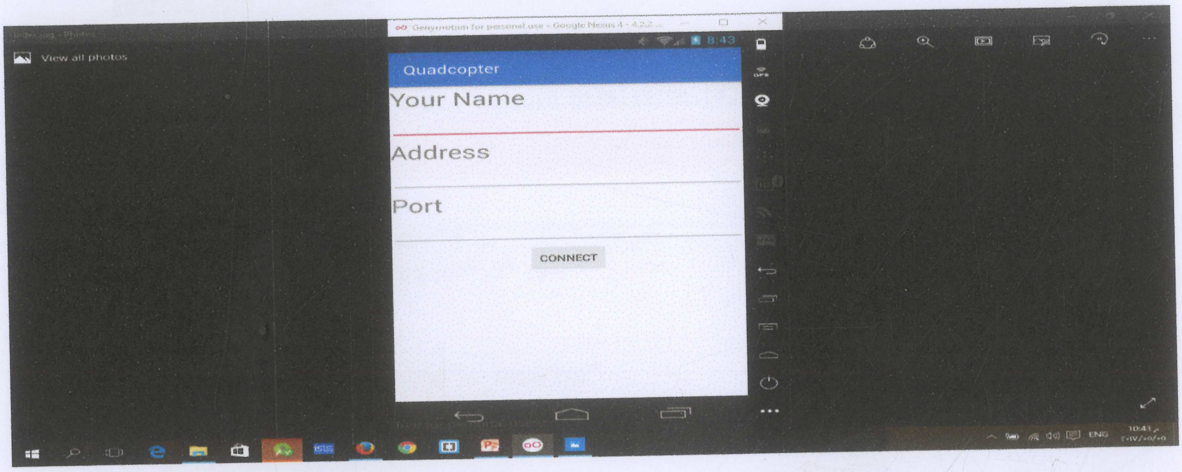
3. **Get permission.** If you are on someone else's property or in a public space, ask for permission to avoid invasion of privacy or other consequences.
4. **Learn the modes and controls.** Different flying modes and settings can affect your flight and ability to control the drone. Before flying, learn which setting is best for you in your selected environment. For example, AR Drone has an outdoor flight mode, left-handed mode or joypad mode.
5. **Check the battery.** Make sure your battery is fully charged to avoid an emergency landing. You should also consider the season. If you're flying in the cold winter, your battery will drain more quickly than it would in the summer.
6. **Be in control.** The emergency land button should be one of the first things you learn before flying the drone. It ensures the drone lands safely if you make a critical error while flying. However, you should only use the emergency land function in true emergencies because the motors will cut out and your drone will drop (which could cause serious harm to those below) Also, keep a direct line of sight on your drone and watch its altitude.

2.4.2 Charging:

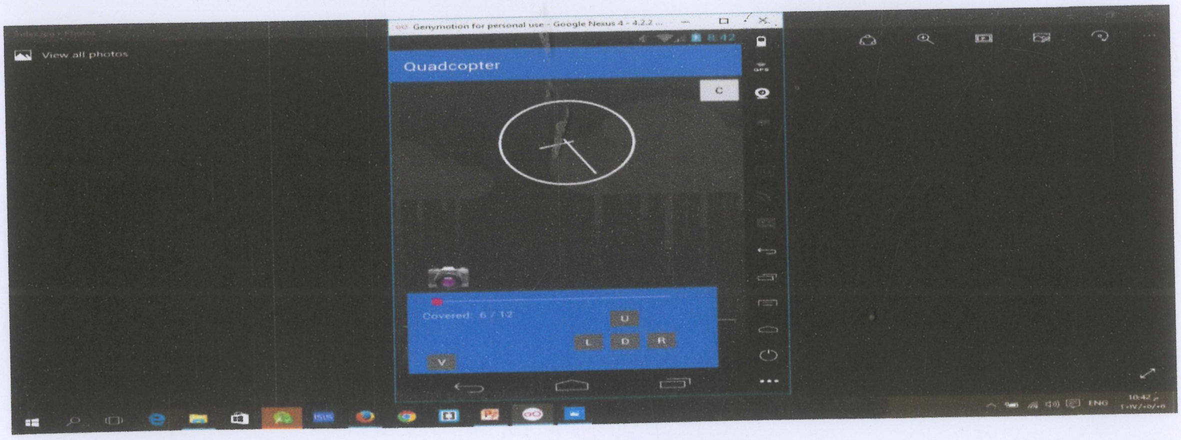
- Do not overcharge the battery. When the battery is fully charged, disconnect it from the charger. Do not put the device back in the charger once charging has finished. You risk causing overheating.
- Do not cover your product or its charger while the battery is charging.
- Recharge the battery at a temperature of between 0°C and 40°C.

5.3 Android Application:

First, connect to the server(quadcopter).



Second: Choose the desired direction and speed.

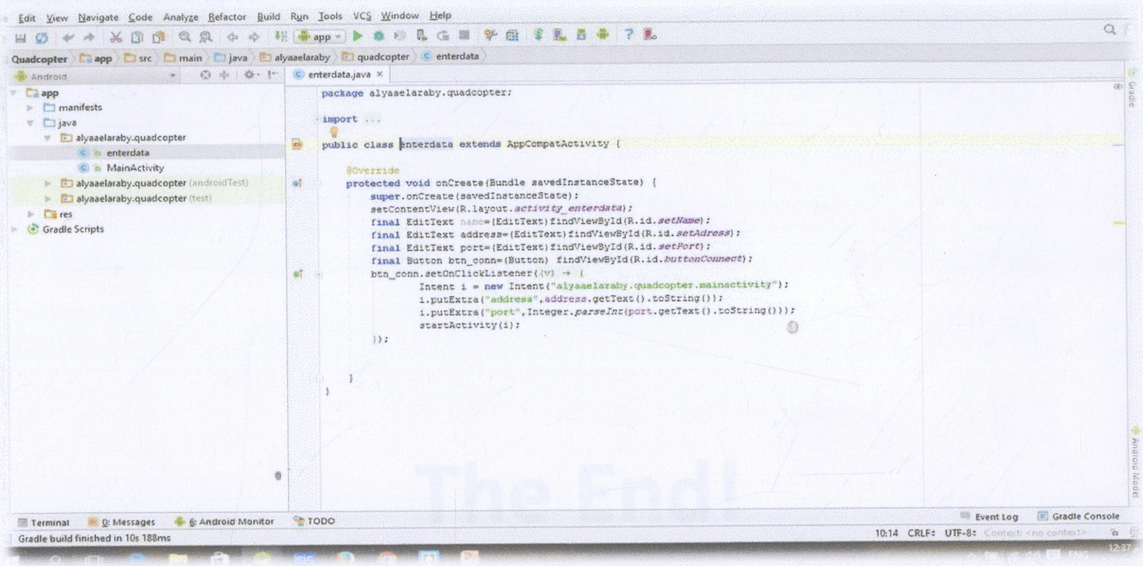


Internet permission:

*AndroidManifest.xml

```xml
<manifest xmlns:android="http://schemas.android.com/apk/res/android"
    package="com.example.androidandmobileservices"
    android:versionCode="1"
    android:versionName="1.0" >

    <uses-permission android:name="android.permission.INTERNET"></uses-permission>

    <uses-sdk
        android:minSdkVersion="8"
        android:targetSdkVersion="15" />

    <application
        android:icon="@drawable/ic_launcher"
        android:label="@string/app_name"
        android:theme="@style/AppTheme" >
        <activity
            android:name=".MainActivity"
            android:label="@string/title_activity_main" >
            <intent-filter>
                <action android:name="android.intent.action.MAIN" />

                <category android:name="android.intent.category.LAUNCHER" />
            </intent-filter>
        </activity>
    </application>

</manifest>
```

Enter ip & port:



Control the speed: