

## Implementation of honeybee persecute for honey extraction using quadcopter

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**Abstract:** Bees make hives to store honey and feed themselves during winter, when they cannot go out to collect food. Wild honey bees make hives in rock cervices, hollow trees and other areas. In cities, they make their hives on the corners of the buildings. There are people who are hired to remove these hives from the buildings, huge trees etc as a common man is scared of bee stings. Removing hives is very dangerous and risky. Honey bee stings are quite painful and even life threatening to a large percentage of people who are allergic to the venom. Honey bees usually sting as a form of defence of themselves or their colony. The main idea is to build a RC controlled flying apparatus (unmanned aerial vehicle, quadcopter) which can fly to high altitudes and release smoke which drives away the bees. It has a RC controlled smoker unit which will release smoke; this smoke will calm down or drive away the honey bees, making it easier for the humans to remove the beehive.

**Keywords:** Human safety, Ignition system, Quadcopter, Smoker unit.

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### I. Introduction

Honeybees are the hardest working creature on the planet, and because of their laborious job, we owe many thanks to this amazing yet often underappreciated insect. Honeybees are responsible for pollinating about one-sixth of the flowering plant species worldwide and approximately 400 different agricultural types of plant. The honeybee is the only social insect whose colony can survive many years; a single hive can have upto 80,000 bees [3]. Honey bees are quite the unique in the sense that they have the ability to produce enough honey - the only known food substance that does not spoil - on a large quantity, large enough to be harvested by humans for their own consumption, thus the name honey bee. Bees live in colonies that contain the queen bee, the worker bee and the drone. Killer bees have been known to chase people for over a 1/4 mile once they get excited and aggressive. Honeybees live in large "families" and are found all over the world. The benefits of honey go beyond its great taste and therefore its demand is also increasing proportionately in today's world.

When the honeybee stings a person, it cannot pull the barbed stringer back out which results in a massive abdominal rupture which kills the honeybee. The honeybees are very useful in pollination which is very essential for plant reproduction. Bees also tend to focus their energies on one species of plant at a time. By visiting the same flowers of a particular species in one outing, much higher quality pollination occurs getting an even distribution of vital pollen from others of its same species. Honey bees produce honey, which has led to the development of many honey industries.

The bee sting may be very painful for a few hours. Swelling and itching may persist for a week. An allergic person may suffer anaphylactic shock from proteins present in the venom which can be life threatening. The B-quad releases smoke that drives away the honeybees instead of killing them, by this way honeybee life can be saved as well as human's life by reducing the risk of honeybee stinging humans.

### II. Existing Methods

#### 2.1 Smoker Can (Bee Smoker)

Smoker Can is a device used in beekeeping to calm honey bees. It is designed to generate smoke from the smouldering of various fuels, hence the name. Smoker can be useful when the bees have to be driven away at very low altitude, or bee-keeping industries, but the main disadvantage of smoker can is that it becomes very difficult to carry it to high altitudes as it is heavy and hot.

#### 2.2 Bee-Suit

A beekeeping suit includes a long-sleeved body covering, a hat with a veil, and gloves and boots to keep out the bees. A heavy duty cotton suit with strong zips is recommended. Bee suits are white because honey bees don't like black. A bee suit protects a person from receiving bee stings. This will enable to do the apiary work without disturbance.

The size of the suit may not be person-specific, so there are chances of honeybees to enter inside. It is sting resistant, but not sting proof. If the fabric of the beekeeping suit is touching your skin, bees can sting

through the fabric into your skin which is the main disadvantage of using bee suit and also it is difficult to wear and climb to the high altitudes which is the usual place of beehives

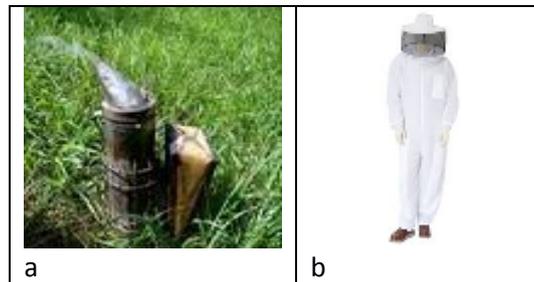


Fig 2.1 (a) Smoker can (b) Bee suit

### III. Proposed Method

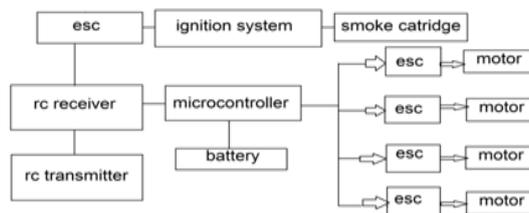


Fig. 3.1 Block Diagram of the Proposed method

There are different structured multi rotors available: Single, coax, Tri, quad, hex and Octo-copters are popularly available multi rotors. The main reason for choosing the Quadcopter is that simply by varying the speed of each of the motors a full 3D motion, rotation and hover is possible. Other reasons being, Quadcopters are symmetrical and embody the simplest principle of operation for controlling roll, pitch, yaw and motion [5]. They are relatively inexpensive to produce and they scale well to production manufacturing techniques.

#### 3.1 Methodology

The methodology includes the following steps:

- 1) A B-quad frame is made by using aluminum U-channel (12 inches).
- 2) A KK 2.1.5 board is used which has ATMEGA644PA microcontroller, gyroscope/accelerometer it stabilizes the quadcopter during flight
- 3) A battery is connected at the bottom of the quadcopter to provide power to the system.
- 4) Four motors are attached on all four sides of the frame, with 4 ESC's and propellers.
- 5) Above the k board, a smoker unit is attached to emit smoke.
- 6) RC transmitter and receiver is used to control the quadcopter.
- 7) The thrust for motor =  $W \cdot 2/4 = 3.5/4 = 800\text{gm}$  thrust motor.

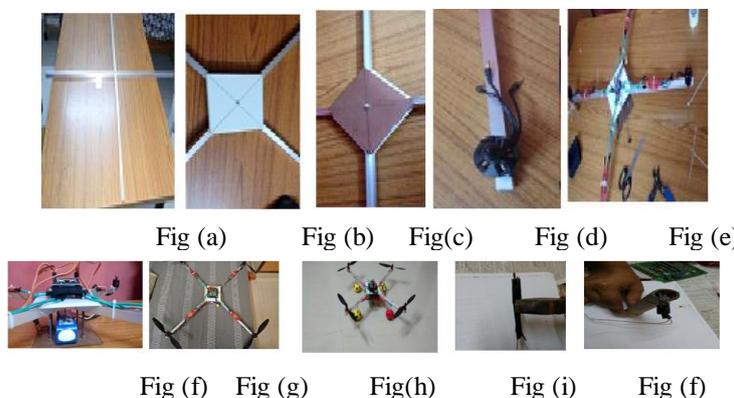


Fig 3.2 (a) Quad frame (b) K board mount (c) Battery mount (d) Fixing motors (e) Installation of ESC's (f) Mounting of KK Board and Battery (g) Fixation of Propellers (h) Assembled Quadcopter (i) Construction of Ignition System (j) Smoke Cartridge

## IV. Implementation Details

### 4.1 Software Requirements

- 1) Windows XP, Windows Vista, Windows 7, or Windows 8
- 2) Intel Pentium 1.0 GHz or equivalent processor
- 3) 512 MB RAM
- 4) 10 GB hard drive space
- 5) DVD drive
- 6) 3-D accelerated video with 32 MB dedicated video memory
- 7) Full DirectX 9 compliant (Shader Model 2.0 or better)
- 8) USB port

### Optimal System:

- 1) Dual core 2.4 GHz CPU
- 2) 2 GB RAM
- 3) 3-D accelerated video with 512 MB dedicated video memory

### 4.2 Hardware Requirements

- 1) QUAD FRAME
- 2) KK.2.1.5 BOARD- ATMEGA 644PA,GYROSCOPE/ACCELEROMETER
- 3) 1100 KV MOTORS(4 IN NUMBER)
- 4) ESC(30 AMPS ESC, 4 IN NUMBER)
- 5) PROPELLERS(4 IN NUMBER)
- 6) 6 CHANNEL TRANSMITTER(2.4 GHZ,1KM RADIUS)
- 7) 6 CHANNEL RECEIVER
- 8) 3 CELL 2200MAH LITHIUM POLYMER BATTERY

## V. Advantages And Disadvantages

### 5.1 Advantages

The B-Quad has many advantages that concern about societal need that are listed below

- 1) The human lives that are risked while tackling with bee are saved.
- 2) The need of human intervention is eliminated from the honey harvesting process.
- 3) The B-Quad is a one-time investment cost effective product when compared to other means.
- 4) The smoker unit which emits smoke is free of chemicals making sure that the honey extracted is retained in its purest form.
- 5) The B-Quad not only saves the life of human but also that of the bees.

### 5.2 Disadvantages

The disadvantage of a B-Quad is:

- 1) The flight control of the quadcopter which can be rectified very easily by practice for better control of it.

## VI. Conclusion and Future Scope

The B-Quad can takeoff smoothly and reach a steady state at height. In future it can be still improved by improving controller actions or use of a better control method may help for a better stabilization. On flight of the quadcopter acts also the wind effect, therefore it is needed to include this effect into the overall stabilization. The quadcopter is able to take a payload of 500 grams which is the smoker unit mounted on top of the KK board.

The B-Quad can be improvised further by mounting a laser unit which is used to cut the bee-hive. The use of robotic arm can be implemented to extract the honey from the bee-hive and hence reducing the human intervention.

## REFERENCES

- [1]. Gaponov, Igor, and Anastasia Razinkova. "Quadcopter design and implementation as a multidisciplinary engineering course." Teaching, Assessment and Learning for Engineering (TALE), 2012 IEEE International Conference on. IEEE, 2012
- [2]. Desa, Hazry Bin, et al. "Flying apparatus for aerial agricultural application." U.S. Patent Application No. 13/701,503.

- [3]. Sugano, Genji. "Device for automatic honey extraction from combs." U.S. Patent No. 2,631,307. 17 Mar. 1953
- [4]. Shah, Mr Kalpesh N., MrBala J. Dutt, and HardikModh. "Quadrotor–An Unmanned Aerial Vehicle." *International Journal of Engineering Development and Research IJDER* 2.1 (2014): 1299-1303.
- [5]. Pounds, Paul, and Robert Mahony. "Design principles of large quadrotors for practical applications." *Robotics and Automation, 2009. ICRA'09. IEEE International Conference on.* IEEE, 2009.
- [6]. Gupte, Shweta, Paul Infant Teenu Mohandas, and James M. Conrad. "A survey of quadrotor unmanned aerial vehicles." *Southeastcon, 2012 Proceedings of IEEE.* IEEE, 2012.
- [7]. Bouabdallah, Samir. *Design and control of quadrotors with application to autonomous flying.* Diss. EcolePolytechniqueFederale de Lausanne, 2007.
- [8]. Sa, Inkyu, and Peter Corke. "Vertical infrastructure inspection using a quadcopter and shared autonomy control." *Field and Service Robotics.* Springer Berlin Heidelberg, 2014