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HUMAN CARRYING QUADCOPTER

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ABSTRACT :
Unmanned Aerial Vehicles (UAVs) like drones and quadcopters have revolutionized flight.They help humans to take to the air in new, profound ways. The military use of larger size UAVs hasgrown because of their ability to operate in dangerous locations while keeping their human operators at asafedistance.HerequadcopterasasmallUAVisdiscussed.Itistheunmannedairvehiclesandplayingapredominantroleindifferentareaslikesurveillance,militaryoperations,firesensing,trafficcontrolandcommercial and industrial applications. We found that the debate is characterized by predominantlytechnicalandregulatoryproblemsandbarrierswhichareconsideredtopreventorimpedetheuseofdronesforparcel and passengers' transportation.

Keywords:Quadrotorhelicopter orQuadrotor, drone's,verticallyoriented propellers

INTRODUCTION

A Quad copter, also called a Quad rotor helicopter or Quad rotor, is a multi- rotor helicopter that is liftedand propelled by four rotors. Quad copters are classified as rotorcraft, as opposed to fixed-wing aircraft,because their lift is generated by a set of rotors (vertically oriented propellers).Unlike most helicopters,quad copters use two sets of identical fixed pitched propellers; two clockwise (CW) and two counter-clockwise (CCW). These use variation of RPM to control lift and torque. Control of vehicle motion isachieved by altering the rotation rate of one or more rotor discs, thereby changing its torque load andthrust/lift characteristics. Target and decoy – providing ground and aerial gunnery a target that simulatesanenemy aircraft ormissile

1.1ScopeofProject :

The purpose of this project is to engineering knowledge to develop a UAV at low cost based onspecifications as finalized in SOR. project will engage the members through proper design cycle whichwill include the implementation of the aircraft design knowledge, as well as other courses, use of thevarious CAD software that they have learnt for design and analysis of their project and make criticaldecisions regarding their design observing its performance as well as their constraints such as budget,manufacturabilityEtc.

Figure1: Quadcopterduring transition

LITERATURESURVEY

In this section the literature survey of weight carrying quadcopters is discussed. The experimentationsconductedbyvariousresearchersbyinfluencingtheunmannedaerialvehicles(UAV)processparametersonspecificweight carrying method's.

2.1Quadcopterhistory:

EtienneOehmichenwasthefirstscientistwhoexperimentedwithrotorcraftdesignsinthe1920s.Amongthesix designshetried,hissecondmulticopperhadfourrotorsandeightpropellers,alldrivenbyasingleengine. The Oehmichen used a steel-tube frame, with two-bladed rotors at the ends of the four arms. Theangle of these blades could be varied by warping. Five of the propellers, spinning in the horizontal plane,stabilized the machine laterally. Another propeller was mounted at the nose for steering. The remainingpairofpropellers wasfor forward propulsion.

METHODOLOGY

In a quadcopter drone, two of the motors rotate in a clockwise direction and the other two motors in ananticlockwise direction. The speed of the motors is controlled by the electronic speed controller. If thetwomotorsontherearsideofthedronerotateathighspeeds,thenthedronemovesinaforwarddirection.Ifthetwomotorsonthe frontsideofthedronerotateathighspeeds,thenthedronemovesinabackwarddirection. If the two motors on the left side of the drone rotate at high speeds, then the drone moves in arightwarddirection.

Introductionwith System BlockDiagram:

Ablockdiagramisahigh-levelandspecializedflowchartusedinengineering.Itisusedtodescribeand improve existing systems or to design new ones. The block diagram's structure provides a high-leveloverview of important working relationships, key process participants, and major system components.Belowis theoverview ofthe majorquadcopter componentsrepresented

asablock diagram

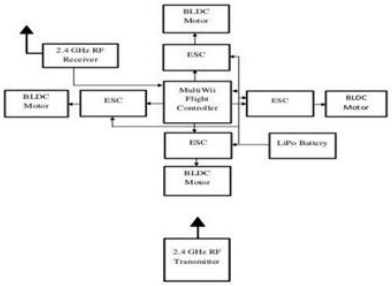

Figure2:Blockdiagramof aQuadcopter

TechnicalSpecification:

Thedrone'stechnicalspecificationisnothingmorethan adocumentthatthroughtechnicaldatamakesaclarified description forthe drone's specificuse,functionality, orperformance

Figure3:Blockdiagramof adrone'sspecificuse,functionality

DesigningofQuadcopterbody:

Aquadcopterisamulti-rotordronethathasfourarmshavingabrushlessdcmotoroneacharm.Quadcopter drone arms are designed in fusion 360 software. Hence this is a delivery drone, the middlepartofthebodyhastobestrongtocarrytheloads.so,asheetmetalbodyhastobeusedfortheupperandbottom parts of the drone connecting four arms. The drone planned for the current work is initiallymodeledin fusion 360software.Figure 2 showsthe design frameof thedroneinfusion 360 software.

Figure4 Modeling and rendering ofaQuadcopterDronein fusion360

Fabrication:

3D printing is also known as additive manufacturing, and it is the process of building a 3d objectfromaCADmodel.Thearmsofquadcopterdrone designedinfusion360software,Additivemanufacturingofquadcopterarmsbyusing PLA(PolylacticAcid)Filamentin3Dprinting.RepetierHostsoftwareis usedforslicing and Creality Ender 3.0is used forprinting parts.

Parameter	Value
Shell Thickness	2 mm
Top and Bottom Thickness	2 mm
Infill Patern	Grid
Support Pattern	Grid
Fill Amount	15%
Print Speed	25 mm/s
Travel Speed	60 mm/s
Layer Thickness	0.2 mm

Table:1Printingparameters

AssemblyandFlightTesting:

3D printed arms of quadcopter assembled to the sheet metal body of the drone. Figureshows thefabricationofthesheetmetalbody.ABrushlessDC motorisconnectedtotheelectronicspeedcontroller(ESC). Motors are placed on edge of the arms and ESC is placed in the middle of the arms. A powerdistributionboardisusedtodistributethepowertoallcomponents.APMflightcontrollerisplacedinthe middleofthe droneand it's connected tothereceiver, ESC, GPS module, and powermodule.

Figure:5FinalAssessment oftheRobot

Hardware components: Most of the parts on a quadcopter are dependant on each other and whenchoosing one part it puts a new set of demands on another. The one most important characteristic to outis the weight if the Quadcopter, since that in turn puts demand on all parts except the ones handlingcalculationsfornavigation.

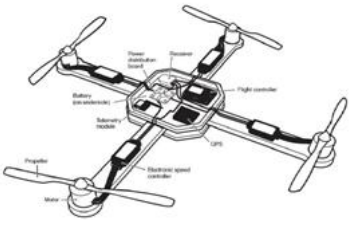

Figure: 6 Overallstructureof the Drone

1.Motor: The motors together with the propellers are needed to provide enough thrust to lift the Quadcopterwiththegrippingmoduleandapayloadofupto20%ofthetotalweight.Sincetheaimistofollowa2:1 thrust to weightratio, the total minimumthrust needed to beat least1.5 kg.

PROPELLORS:

A propeller is a type of fan that transmits power by converting rotational motion into thrust. Apressure

difference is produced between the forward and rear surfaces of the airfoil-shaped blade, and afluid (such as air or water) is accelerated behind the blade. Propeller dynamics can be modelled by bothBernoulli'sprincipleandNewton's third law.

It is also the main part of the quad copter for flying, there are two types of propellers used in the quadcopter they mostly left-hand propellers and right-hand propellers. 25 Left hand propellers are also callednormalpropellersandthey aremountedto themotor which ismoving incounterclockwise direction.

MULTIROTOR CONTROLBOARD

TheKK.2multicontrollerisaflightcontrolboardforremotecontrolmulticopterswith2,3,4and6rotors.Itspurposeistostablisetheaircraftduringflight.Todothisittakesthesignalfromthethreegyrosontheboard (roll, pitch and yaw) and feeds the information into the Integrated Circuit (Atmega IC). This thenprocesses the information according the the KK software and sends out a control signal to the ElectronicSpeedControllers (ESCs)which areplugged ontotheboard andalso connectedto themotors.

Specifications:-

Size: 50.5mm x 50.5mm x 12mmWeight: 21 gram (IncPiezo buzzer)IC:Atmega324 PA

Gyro:InvenSenseInc.

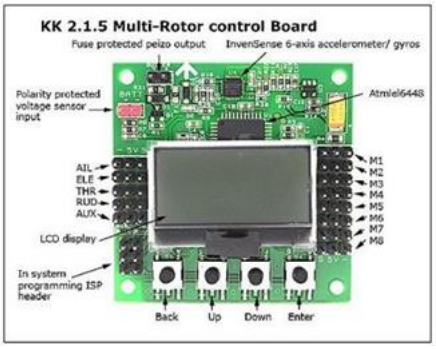

Figure:7Multi-rotorcontrolboard

ELECTRONICSPEEDCONTROLLER(ESC

AnelectronicspeedcontrolorESCisanelectroniccircuitwiththepurposetovaryanelectricmotor'sspeed, its direction and possibly also to act as a dynamic brake. ESCs are often used on electricallypowered radio controlled models, with the variety most often used for brushless motors essentiallyproviding an electronically generated three-phase electric power low voltage source of energy for themotor.

Wehaveused60Aelectronicspeedcontrollerstocontroleachbrushlessmotorsinthisexperimentwhichcanconstantly supplyrequired currentto drivebrushless motors.It hasfollowing specifications:

ConstantCurrent:60A

BurstCurrent:80A

BRUSHLESSMOTOR

Brushless DC electric motor (BLDC motors, BL motors) also known as electronically commutatedmotors (ECMs, EC motors) are synchronous motors which are powered by a DC electric source via anintegratedinverter/switchingpowersupply,whichproducesanACelectricsignaltodrivethemotor(AC,alternating current, does not imply a sinusoidal waveform but rather a bi-directional current with norestriction on waveform); additional sensors and electronics control the inverter output amplitude andwaveformand frequency(i.e. rotorspeed).

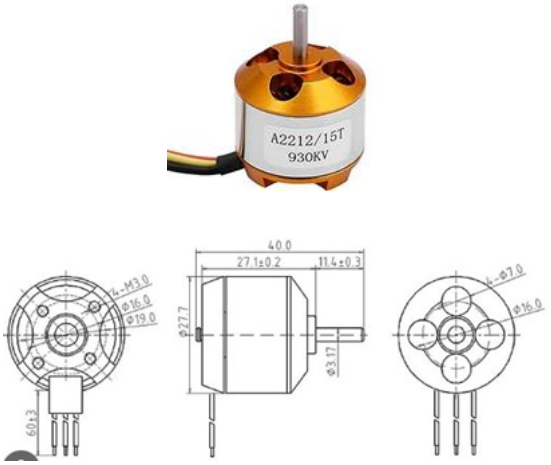

FIGURE: 8BrushlessMotor

LITHIUMPOLYMER(LI-PO)BATTERY

LiPo batteries (short for Lithium Polymer) are a type of rechargeable battery that have become verypopular because of their power to rate ratio. In other words, more electricity in a lighter package.Obviously, this is ideal for anything you're trying to get to fly. Another advantage is that LiPo's have ahighdischargerate –which means they candeliver large amounts ofpowerat once.

FIGUER:9Li-PoBattery

Specifications:

•BatteryConfiguration:11.1V2200mAh3cell

•BatteryCapacity:2200mAh

•MaxContinuousDischarge(C-rate/current):20CMaxBurst(3Sec)(C-rate/current):45C

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AnRFModule(RadioFrequencyModule)isausuallys mallelectroniccircuitusedtotransmitand/orreceivera diosignalsononeofanumberofcarrierfrequencies.RF Modulesarewidelyusedinelectronicdesignowing to thedifficulty of designing radio circuitry.

Figure:10 Frequencytransmitter

Receiverspecification:

Channel:6

Frequencyband:2.4GHz

Powerresource:1.5V*4''AA''battery

Programtype:GFSK

Weight:25G

Schematic of reaction torques on each motor of a quadcopter aircraft, due to spinning rotors. Rotors1and3spininonedirection,whilerotors2and4sp inintheoppositedirection,yieldingopposingtorquesfo rcontrol.

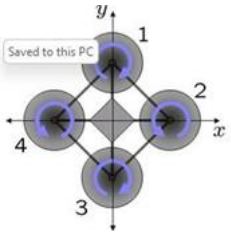

Figure:11Spinningdirection

Workingprincipleandworking

In this study, the aircraft was assumed to be a drone, which means it also stores the energy in the batteryduring the flying period. In this way, both flying the drone by using solar energy and storing the energyin the battery in order to extend the flight time can be achieved. The principle in which the drone worksonit is NEWTONS

THIRD LAWOFMOTION.

Figure:12Pitchmotion

RESULTS

The testing done includes both the testing with different Payload, the testing of the Quadcopter. So inorderfor thetesting to go on many things haveto be donewhich includes

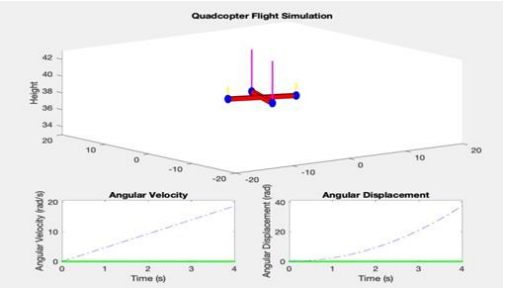

Figure:13testingwithdifferentPayload

ApplicationPerformanceManagement(APM)hastost abilizeandwhenthisisdoneyouhearthepeepsoundtelli ng you that theQuadcopterisready.

Afterthatthe APMisarmed.

Thethrottleis increasedslightly.

Thenonthetransmitter it shouldbeinchannel 1

Afterit is switched tochannel 2 which autonomouslyfly.

Afterthatthe returntolaunch modehelpsit returntoorigin

CONCLUSION

Theprocessofmoduletransportation,rigging,lifting,a ndinstallationisuniquetothemodularconstruction method, one of the critical barriers to implementing the modular construction technique andexecuted inefficiently by practitioners. If the process is innovated, the construction industry will achievebroaderandmoreeffectiveuseofmodularizati on.Recently,droneshavedrawnincreasingattentionfr omresearchers and others in the construction industry due to rapid advancements in related technologies andapplications.

Thekeychallengesthathavebeen identifiedfromthemanualtestflight are:
Limitedpayload.
Limitedpowersupply.
Dynamicpropertiesofamodule.
Agility/instabilityofuas;and
Regulations.
However, if these challenges can be overcome through the use of the UAV-based module method,transportation times, lifting times, and costs can be significantly reduced, eventually diminishing totalinstallation costs, and expediting the overall construction process. This innovative method will help theindustry to overcome key barriers of modular construction: site access problems, site congestion issues,andthe limited availability of local heavy lift equipment.

REFERENCES

CFDstudyofanannular-ductedfanliftsystemforVTOLaircraft2015byYunJiang,BoZhang&TaoHuanghttps://www.researchgate.net/publication/282350303_CFD_study_of_an_annul
Quadcopterthrustoptimizationwithducted-propeller2017byEndorseesKuantama&RaduCatalinTarcahttps://www.researchgate.net/publication/320285199_Quadcopter_thrust_optimization_with_ducted-propeller
How ducting a propeller increasesefficiency and thrusthttps://www.youtube.com/watch?v=Cew5JF8q6eY
StandardizationDecember2018roadmapForUnmannedAircraftSystems,Version1.0PreparedbytheANSI Unmanned Aircraft Systems Standardization Collaborative(UASSC)
Brushless DC Motor vs. AC Motor vs. Brushed Motor in oriental motor.https://www.orientalmotor.com/brushless-dc-motors-gear-motors/technology/AC-brushless-brushed-motors.html
Brushless Motors vs. Brushed Motors - What's the Differencehttps://www.thomasnet.com/articles/machinery-tools-supplies/brushless-motors-vs-brushedmotors/
https://www.amazon.com/RSII2206-Brushless-Support-Compatible-Quadcopter/product?reviews/B07HJ3C5TR?reviewerType=all_reviews
All About a Multirotor FPV Drone Power Distribution Board | Getup Learnhttps://www.getfpv.com/learn/new-to-fpv/all-about-multirotor-fpv-drone-power-distributionboard/
https://dronenodes.com/drone-flight-controller-fpv/
DroneTransmitterandReceiver –RadioControl SystemGuide-DroneNodes