iJRASET
International Journal For Research in Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 9 **Issue:** VII **Month of publication:** July 2021

DOI: https://doi.org/10.22214/ijraset.2021.36542

www.ijraset.com

Call: 08813907089 | E-mail ID: ijraset@gmail.com

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.429
Volume 9 Issue VII July 2021- Available at www.ijraset.com

Design and Implementation of Sanitization Drone System

Er. Akhilendra Yadav[1], Rahul Gangwar[2], Sachin Rathore[3], Utkarsha Sharma[4], Muskan Srivastav[5]
[1]*Assistant professor, Electrical and Electronics, S.R.M.S.C.E.T., Bareilly, India*
[2, 3, 4, 5]*Student, Electrical and Electronics, S.R.M.S.C.E.T., Bareilly, India*

Abstract: ***Quadcopter are slowly finding its way into various sector applications including security, oil & gas, public health, etc. This Aerial Vehicles provides faster and reliable solutions for many real time challenge and day to day life problems. Spraying sanitizers using drone is one such solution especially in COVID-19 pandemic situation. Quadcopter is designed to carry up to 2.5 litres of sanitizer in its reservoir and the sanitizer spray system is designed to spread the liquid as droplets at a constant flow rate. quadcopter is made of carbon fibre material and equipped with autonomous module as flight controller. The UAV can be operated in both manual and autonomous modes to increase the relieve of operation for indoors as well as in outdoors sanitization process.***

Keywords: ***Quadcopter; Sanitization; Social Welfare; Economical***

I. INTRODUCTION

This project is based on sanitization using drone. The drone, which the most important elements are frame, propellers, engine, system of power the electronic control and communication system. The residence time of the drone flying in the air depends both on the type of drive and the type of power supply. Propellers mounted on arms increases the strength of a drone allowing more thrust and lift capacity and insuring the parallel engine in case of a failure. Thus, the own weight of quadcopter is reduced, the material costs are falling and the drone can carry a heavier load. The size of the wings is very important. The larger is the diameter; the lower is the speed, and thrust which contributes to a reduction of drone volatility. The larger the wing blades, the greater aerodynamic lift generated. This project helped us to understand the mechanical, electrical and control system configuration that goes into building and flying a Quadcopter. We understood the PID automation control mechanism using which the Quadcopter tries to stabilize itself for a smoother flight.

A. Components And Design

1) *Frame:* It is the structure that holds or houses all the components together. They are designed to be strong and light weight. To decide the appropriate frame for the copter 3 factors i.e. weight , size and , materials used are considered. The frame should be rigid and able to minimize the vibrations from the motors. It consists of -

a) The center plate where the electronics components are mounted.
b) Four arms mounted to the center plate.
c) Four motor brackets connecting the motors to the end of the arms.

Frames are usually made of:

- Carbon Fiber- It is the most rigid and vibration absorbent but it is the most expensive too.
- Aluminium- Hollow aluminium square rails are the most popular for the arms due to its light weight, rigidness and affordability. However aluminium can suffer from motor vibrations .
- Wood/Plywood/MDF(Medium density fibreboard)- Wood boards like MDF plates could be used for the arms as they are better at absorbing the vibrations than aluminium. Unfortunately the wood is not very rigid material and can break easily if the quadcopter crashes.



©IJRASET: All Rights are Reserved

2) *Rotors Or Motors:* The purpose of motors is to spin the propellers. DC motors provide the necessary thrust to propel the craft. Each rotor needs to be controlled separately by a speed controller.

A2212 Brushless motor is used in the quadcopter. Ratings of motor:
Kv: 1000 RPM/V
Max. efficiency: 80%
Max. efficiency current: 4-10 A (<75%) Max. watts : 150 W
Weight: 52.7 g
Poles: 14

The brushless motors do not have a brush on the shaft which takes care of switching the power direction in the coils, and that's why they are called brushless. Instead the brushless motors have three coils on the inner (center) of the motor, which is fixed to the mounting. Brushless motors spin in much high speed and use less power at the same time. Also they don't lose power in the brush transition like the DC motors do, so its more energy efficient.



Figure 1) Rotors or Motors

3) *Battery- Power Source:* 2200 mAH Li-po(Lithium Polymer) battery is used because it is light. NiMH(Nickel Metal Hydride) is also possibl . They are cheaper, but heaver than LiPo. LiPo batteries also have a C rating anda power rating in mAH. 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.



Figure 2) Battery

4) *Flight Controller:* The fligt controller board is regarded as as the brain of the quadcopter. It houses sensors such as the gyroscopes and accelerometers that determine hoe fast each of the quadcopter's motors spin. Flight control boards range from simple to highly complex. An affordable, easy to set up, having a strong functionality controller is always recommended. Such controllers can handle about any type of multirotor aircraft.



Figure 3) Flight Controller

©IJRASET: All Rights are Reserved

5) *ESC – Electronic Speed Controller:* The electronic speed controller controls the speed of the motor or tells the motors how fast to spin at a given time. For a quadcopter , four ESCs are then connected directly to the battery through a power distribution board. Many ESCs come with a built in batteryeliminator circuit (BEC), which allows to power things like the flight control board and radio receiver without connecting them directly to the battery.Because of the motors on the precise speeds to achieve accurate flight, the ESC is very important. The frequency of the signals also vary a lot, but fora quadcopter it is preferred if the controller supports high enough frequency signal, so the motor speed can be adjusted quick for optimal stability.



Figure 4) Electronic Speed Controller

6) *Propellers:* A quadcopter has four propellers, two propellers that spin counter-clockwise, and two propellers that spin clockwise. By making the propeller pairs spin in each direction, but also having opposite tilting, all of them will provide lifting thrust without spinning in the same direction. This makes it possible for the copter to stabilize the yaw rotation, which is the rotation , which is the around itself. The propellers come in different diameters and pitches (tilting effect). The larger diameter and pitch is, the more thrust the propeller can generate. It also requires more power to drive it, but it will be able to lift more weight .



Figure 5) Propellers

7) *Radio Transmitter And Receiver:* The radio transmitter and receiver allows to control the quadcopter. Four channels for a basic quadcopter is required.. Using a radio with 8 channels, so there is more flexibility id recommended. Quadcopters can be programmed and controlled in many different ways but the most common ones are by RC transmitter in either Rate (acrobatic) or stablemode. The difference is the way the controller board interprets the orientations feedback together with the RC transmitter joysticks.



Figure 6) Radio Transmitter And Receiver

8) *Jets and Sprays:* Surfaces that are not accessible for mopping can be cleaned using jets and sprays. An aerosol created using disinfect- ant and the base fluid combination can be used to spray the inaccessible areas. The nanometer-sized corona embedded in micron sized cough droplets can easily reach inaccessi- ble areas when an infected person coughs or sneezes. So a proper use of spray and jet should be employed to disinfect such inaccessible surfaces.

©IJRASET: All Rights are Reserved

ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.429
Volume 9 Issue VII July 2021- Available at www.ijraset.com

II. SOFTWARE

A. Arduino IDE

This software is required to program both transmitter-receiver Arduino UNO as well as ESP32 AI . Radiohead and MLX90614 Libraries are necessary to program Transmitter and MLX sensor respectively. To program the esp board must be selected in the tool box window .The serial monitor gives IP address os the camera and real time sensed body temperature.

III. LITERATURE

Sanitization is a practical approach to tackle the issues associated with infection and contamination. The crucial requirement of sanitization in recent pandemic time brought an area of active research to cater to any health issues in the future spread of unpredictable disease(s). Sanitization as an area of interdisciplinary research needs a central focus in the longer and better run. One should address the community level spread of disease at individual scales before handling it on a social scale with care. Individual sanitization helps in decreasing the mammoth spread of virus and stop it from taking a colossal shape for the society as a whole. Crowd is made of individuals who are a part of a crowd itself and so it is on every individual to act for the benefit an help of the larger group. Masks and etiquettes of sneezing have been largely promoted since the outbreak of a pandemic. Different regulatory bodies along with government have also stressed the central role of hand sanitization.

For the disinfection of the hand, alcohol-based hand rub or soap with water are preferred according to (WHO 2020b). The alcohol-based hand rubs are mainly formulated with ethanol, pro- pan-2-ol or propan-1-ol. Some of the hand sanitizers also contain additional chemicals such as triclosan, chlorhexidine for better results.

IV. APPLICATIONS

Quadcopter has variety of applications in the field of the research, military and many more. Their small size and agile manoeuvrability prove a great strength to these quad copters and they can flown indoor as well as outdoors.

They use an electronic control system and electronic sensor to stabilize the aircraft.

Some applications are –

A. Agriculture

Quadcopter help farmers optimize the use of inputs such as seeds, fertilizers, water, and pesticides more efficiently. This allows timely protection of crops from pests, saves time for crop scouting, reduces overall cost in farm production, and secures high yield and quality crops.

B. Sanitization

This quadcopter is capable to sanitize the small area in hospitals containment zones etc. due to its construction, size and the weight it can carry.

V. BLOCK DIAGRAM

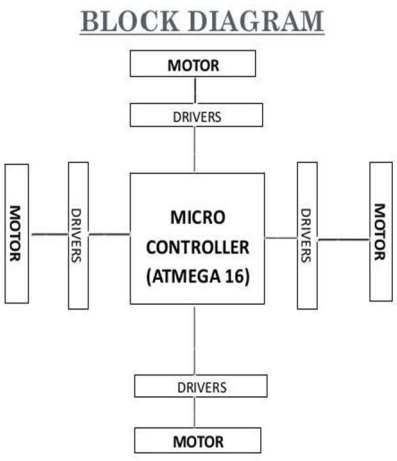


Fig .1

©IJRASET: All Rights are Reserved



Fig.1

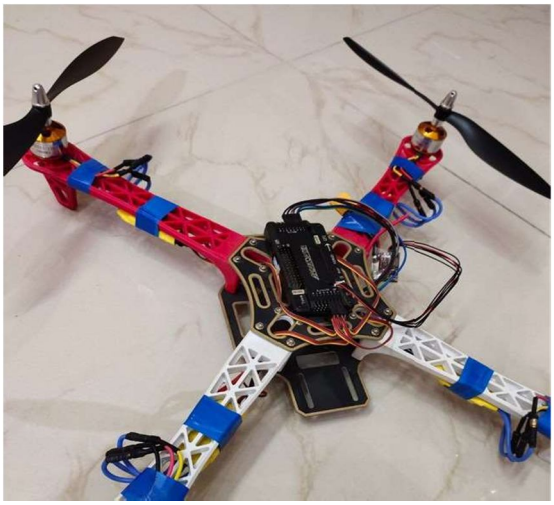


Fig.2

VI. DISCUSSION

A. The main points is that with growing progress in technology , drones too are coming in different shapes , sizes and configurations for better stability Moreover , extended components like camera , GPS tracker made it easy in mission completion, search surveillance etc.

B. After 10 years , the market for drones well reach $1.7 Billion .Each year , $6.4 billion is being spend on developing drone technology the drone are even providing new job opportunities .70000, new drone related projects within next three years are going to start itself in U.S.A alone . So no need for people to be in fear about losing their jobs because of replacement by robots and drones in forthcoming future

Since the advantage of quadcopter technology are more than its disadvantages , then according to drone experts , drones will be ‘’ is trends ‘’ within next 10 years to 15 years ahead .

There is a wide scope that with its extending use in almost every field and with greater powerful components, drones will surely come into full time existence in upcoming future.

©IJRASET: All Rights are Reserved

VII. RESULT

Drones will soon be an imperative existence in the forthcoming future .They will be seen taking up major roles for the variety of business in the upcoming future They could become a part of our day to day lives , from smaller details to major answers .
Most drone are controlled by either software or other computer programs .The components of a drone also vary as it based on what type of work needs to be done and how much payload needs to be carried.
Batteries , electronic speed controller etc, all come in different ranges according to the type of work needed by the quad copter.
Quad copters are a major provisional craft that could get in between airplanes and big helicopters And are hence easier to fly as required Quad copters offers to be a great balance between cost, capability ,and performances .
The only problem is when funds are required and coupled with highly ambitious projects like ours
Hence quad copters have a great future the onus lies upon us whether we productively use it or destructively manner.
Quad copters are drones first come as an application as small toys or school projects and then no sooner began to gain widespread attention , used in big- budget movies , photography , agriculture use as rectify lands and detect levels of pesticides required to sanitize if required as well as search and rescue ,land mapping , military etc.
The commercial a as well as private use of drones is enlarging.
Quadcopter drone can effectively carry 2.5liters of sanitizer and fly for 20 minutes with 2200 mAh battery
Larger area can be disinfected with smaller man work force and in a short duration.
Improved safety for the personnel working in the disinfection process and area.

VIII. CONCLUSION

The centrality of sanitization as a means of controlling the spread of pandemic is established when we evaluate the no. Of methods of sanitization employed to work in the COVID19 pandemic. The categorisation of sanitization depends on the ways of infection. Three possible ways of infection (i) direct, (ii) indirect and (iii) airborne transmission have been come out as the cause of spread of this pandemic. Individual, object and space sanitization are needed to stop the spread of COVID-19 at present situation. The end goal of any sanitization process is to removal of the virus and inactivate it. Mechanical removal, thermal treatment and chemical disinfection are used in isolation or in combination in the listed categories of sanitization. On an individual level, hand washing and oral hygiene are highly recommended especially in these situations. Masks have become an important part of attire to stop the spread of virus and sanitization of masks has become a scientifc concern. Heat treatment like baking, microwave steam heating; UV irradiation and chemical treatment using vaporised hydrogen peroxide, ozone gas has been recommended as well. Spaces and objects can be disinfected using mops/wipes, jets and sprays, UVC irradiation, fogging and fumigation etc. Ventilation and filtering of contaminated air is an important means of sanitizing high-risk zones like hospitals containment zones and restaurants. Can be used in agriculture as well. Since the majority of the processes come with added risks to health due to chemical or radiation overuse, a balanced and non-obsessive sanitization behaviour is recommended. Sanitization based research is a void where technologies and research other than those focused on chemical disinfectants can play a crucial role.

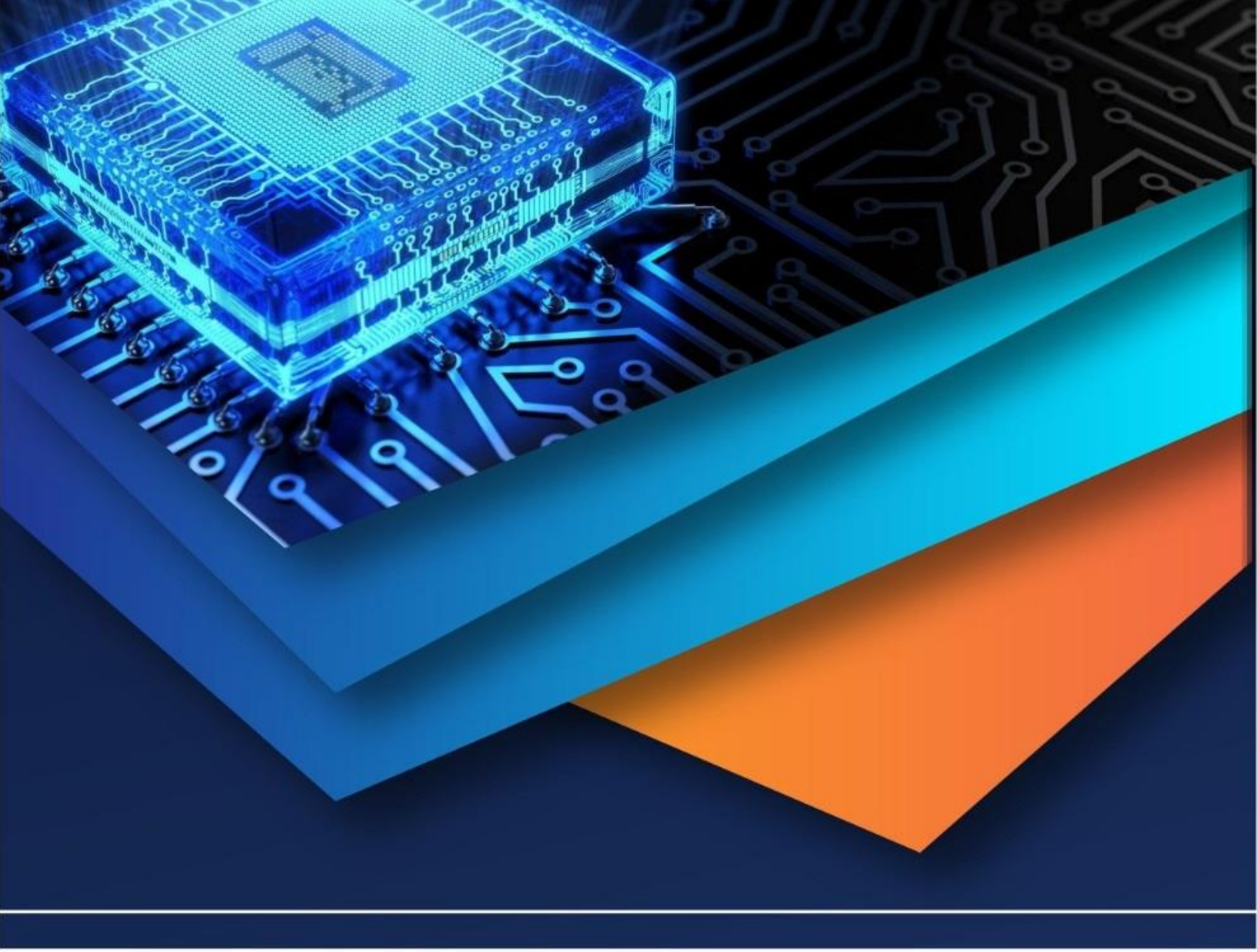
REFERENCES

[1] Andersen BM, Rasch M, Kvist J, Tollefsen T, Lukkassen R, Sandvik L, Welo A (2009) Floor cleaning: effect on bacteria and organic materials in hospital rooms. J Hosp Infect 71(1):57–65
[2] Anufriev IS, Sharypov OV, Shadrin EY (2013) Flow diagnostics in a vortex furnace by particle image velocimetry. Tech Phys Lett 39(5):466– 468
[3] Anuradha P, Devi PY, Prakash MS (1999) Effect of handwashing agents on bacterial contamination. Indian J Pediatr 66(1):7–10
[4] Asadi S, Wexler AS, Cappa CD, Barreda S, Bouvier NM, Ristenpart WD (2019) Aerosol emission and superemission during human speech increase with voice loudness. Sci Rep 9(1):1–10
[5] Asadi S, Bouvier N, Wexler AS, Ristenpart WD (2020) The coronavi- rus pandemic and aerosols: Does COVID-19 transmit via expira- tory particles? Aerosol Sci Technol 54(6):635–638
[6] AYUSH (Ministry of Ayurvedic, Unani, Siddha and Homeopathy) (2020) Ayurveda's immunity boosting measures for self care dur- ing COVID 19 crisis. https://ostingAYUSHAdvisory.pdf
[7] Baker KK, Farzana FD, Ferdous F, Ahmed S, Das SK, Faruque ASG, Nasrin D, Kotloff KL, Nataro JP, Kolappaswamy K, Levine MM (2014) Association between moderate-to-severe diarrhea in young children in the global enteric multicenter study (GEMS) and types of handwashing materials used by caretakers in Mir- zapur, Bangladesh. Am J Trop Med Hyg 91(1):181–189
[8] Bhardwaj R, Agrawal A (2020) Likelihood of survival of coronavirus in a respiratory droplet deposited on a solid surface. Phys Fluids 32(6):061704
[9] Biswal M, Kanaujia R, Angrup A, Ray P, Singh SM (2020) Disinfec- tion tunnels: potentially counterproductive in the context of a prolonged pandemic of COVID-19. Public Health 183:48
[10] Bloomfield SF, Nath KJ (2009) Use of ash and mud for handwash- ing in low income communities International Scientific Forum on Home Hygiene (IFH). In: International Scientific Forum on Home Hygiene,Somerset

©IJRASET: All Rights are Reserved

[11] Bondi CAM, Arbogast JW, Macinga DR, Lambkin-Williams R, Moane E (2007) Virucidal performance of various professional hand hygiene products against avian influenza A H5N1. Am J Infect Control35(5):E34–E35
[12] Brewer C, Streel E (2020) Is alcohol in hand sanitizers absorbed through the skin or lungs? Implications for disulfiram treatment. Alcohol Alcohol55(4):354–356
[13] Burfoot D, Hall K, Brown K, Xu Y (1999) Fogging for the disinfec- tion of food processing factories and equipment. Trends Food Sci Technol 10(6–7):205–210
[14] Cadnum JL, Mana TS, Jencson A, Thota P, Kundrapu S, Donskey CJ (2015) Effectiveness of a hydrogen peroxide spray for decon- tamination of soft surfaces in hospitals. Am J Infect Control 43(12):1357–1359
[15] Cha CN, Park EK, Yoo CY, Jung JY, Son SE, Kim S, Lee HJ (2016) Virucidal efficacy of a paraformaldehyde-containing fumigant against Avian influenza virus. J Prev Vet Med40(2):68–70
[16] Chamola V, Hassija V, Gupta V, Guizani M (2020) A comprehensive review of the COVID-19 pandemic and the role of IoT, drones, AI, blockchain, and 5G in managing its impact. IEEE Access 8:90225–90265
[17] Chayaprasert W, Maier DE, Subramanyam B (2010) A simplified and improved modeling approach for the structural fumigation pro- cess using computational fluid dynamics. Julius-Kühn-Archiv 425:237
[18] Chen W, Vermaak I, Viljoen A (2013) Camphor—a fumigant during the black death and a coveted fragrant wood in ancient Egypt and Babylon— a review. Molecules 18(5):5434–5454
[19] ChungYK,Lam-PhuaSG,ChuaYT,YatimanR(2001)EvaluationofbiologicalandchemicalinsecticidemixtureagainstAedesaegypti larvaeand adultsbythermalfogginginSingapore.MedVetEnto-mol15(3):321–327
[20] Dayrit FM, Newport MT (2020) The Potential of Coconut Oil as an Effective and Safe Antiviral Agent Against the Novel Coronavirus (nCoV- 2019)Dbouk T, Drikakis D (2020) On coughing and airborne droplet trans- mission to humans. Phys Fluids 32(5):053310
[21] De Sousa A (2020) Disulfiram ethanol reaction in a patient absti- nent from alcohol caused by hand sanitizing. Alcohol Alcohol 55(4):349
[22] De Gennes PG, Brochard-Wyart F, Quéré D (2013) Capillarity and wet- ting phenomena: drops, bubbles, pearls, waves. Springer, Berlin Dereagzi H(2020) Turkish firm pioneers disinfection against COVID-https://www.aa.com.tr/en/latest-on-coronavirus-outbreak/ turkish-firm-pioneers-disinfection-against-covid-19/1776693. Accessed 15 June 2020
[23] Diwan SS, Ravichandran S, Govindarajan R, Narasimha R (2020) Understanding transmission dynamics of COVID-19-type infec- tions by directnumericalsimulationsofcough/sneezeflows.TransIndianNatnlAcad Eng5:255–261
[24] DRDO (Defence Research and Development Organisation) (2020). Specification for personal sanitisation enclosure (pse) (vvip ver- sion). https://drdo.gov.in/sites/default/files/whats_new_document/ specs_for_VVIP_PSE.pdf. Accessed 15 June 2020
[25] Duguid JP (1946) The size and the duration of air-carriage of respira- tory droplets and droplet-nuclei. Epidemiol Infect 44(6):471–479 Emami A, Javanmardi F, Keshavarzi A, Pirbonyeh N (2020) Hidden threat lurking behind the alcohol sanitizers in CoVID-19 outbreak.
[26] Derm Ther. https://doi.org/10.1111/dth.13627
[27] FAQ-USEPA(2020)https://www.epa.gov/coronavirus/can-i-use-fumigation-or-wide-area-spraying-help-control-covid-19.Accessed11June 2020
[28] Ghaffari S, Roshanravan N, Tutunchi H, Ostadrahimi A, Pouraghaei M, Kafil B (2020) Oleoylethanolamide, a bioactive lipid amide, as a promising treatment strategy for coronavirus/covid-19. Arch Med Res 51(5):464–467
[29] Han ZY, Weng WG, Huang QY (2013) Characterizations of particle size distribution of the droplets exhaled by sneeze. J R Soc Inter- face 10(88):20130560
[30] Hilmarsson H, Traustason BS, Kristmundsdóttir T, Thormar H (2007) Virucidal activities of medium-and long-chain fatty alcohols and lipids against respiratory syncytial virus and parainfluenza virus type 2: comparison at different pH levels. Arch Virol 152(12):2225–2236
[31] Himel CM (1971) New concepts in insecticides for silviculture and old concepts revisited. In: Proceedings of the fourth international agricultural aviation congress (1969), Wagenigen, pp 275–281
[32] Hoffmann WC, Walker TW, Fritz BK, Gwinn T, Smith VL, Szumlas D, Quinn B, Lan Y, Huang Y, Sykes D (2008) Spray characterization of thermal fogging equipment typically used in vector control1. J Am Mosq Control Assoc 24(4):550–559
[33] Hoque BA, Briend A (1991) A comparison of local handwashing agents in Bangladesh. Tropical Med Int Health 94(1):61–64
[34] Huang H, Fan C, Li M, Nie HL, Wang FB, Wang H, Wang R, Xia J, Zheng X, Zuo X, Huang J (2020) COVID-19: a call for physical scientists and engineers. ACS Nano 14(4):3747–3754
[35] Huynh-Delerme C, Artigou C, Bodin L, Tardif R, Charest-Tardif G, Verdier C, Sater N, Ould-Elhkim M, Desmares C (2012) Is etha- nol-based hand sanitizer involved in acute pancreatitis after exces- sive disinfection?—An evaluation with the use of PBPK model. J Toxicol 959070:2012
[36] Ji D, Fan L, Li X, Ramakrishna S (2020) Addressing the worldwide shortages of face masks. BMC Mater 2(1):1–11
[37] Jing JLJ, Pei Yi T, Bose RJ, McCarthy JR, Tharmalingam N, Mad- heswaran T (2020) Hand sanitizers: a review on formulation aspects, adverseeffects,andregulations.IntJEnvironResPublicHealth17(9):3326
[38] Kampf G (2018) Antiseptic stewardship for alcohol-based hand rubs.Antiseptic stewardship. Springer, Cham, pp 643–650
[39] Kampf G, Todt D, Pfaender S, Steinmann E (2020) Persistence of coronaviruses on inanimate surfaces and their inactivation with biocidal agents. J Hosp Infect 104(3):246–251
[40] Kashyap U, Saha SK (2020) Enhanced design of PPE based on electro- static principle to eliminate viruses (SARS-CoV-2). Trans Indian Natl Acad Eng 5:337–341
[41] Kim DK, Kang DH (2018) UVC LED irradiation effectively inactivates aerosolized viruses, bacteria, and fungi in a chamber-type air dis- infection system. Appl Environ Microbiol 84(17):e00944-e1018
[42] Kratzel A, Todt D, V'kovski P, Steiner S, Gultom M, Thao TTN, Ebert N, Holwerda M, Steinmann J, Niemeyer D, Dijkman R (2020) Inactivation of severe acute respiratory syndrome Coronavirus2 by WHO-recommended hand rub formulations and alcohols. Emerg Infect Dis 26:1592–1595

©IJRASET: All Rights are Reserved



10.22214/IJRASET

45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Call : 08813907089 (24*7 Support on Whatsapp)