

Design and Development of Manually Controlled, Fly Insects Repellent Window

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Abstract— Controls of dipterous creepy crawlies are a couple of things of most extreme significance inside of the blessing day with rising scope of mosquito borne infections. Deforestation partner degreed industrialized cultivating additionally are 2 of the components incurring a danger increment inside of the change of mosquitoes. Claim to fame item like dipterous bug repellent wont to battle mosquito's region unit required. Each of the item utilized for dipterous creepy crawly administration have variable degrees of viability. Dipterous bug anti-agents were concentrated on amid this audit that livelihood to repulse mosquitoes. Configuration and advancement of mosquito repellent window is basic with its most profitable components which is a solitary shot establishment with less upkeep cost. The expense of this item falls in thousands when then this item is mass delivered so that everybody can bear the cost of effortlessly which likewise helps them in slaughtering mosquitoes and aides in lessening mosquito infections, for example, intestinal sickness, dengue and other fatal maladies this item doesn't bring about ecological contamination besides decreases skin disturbance, eye bothering, troublesome of breathing chemicals so me and my educator we trust this item can broadly succeed in business sector which additionally fulfills a need of executing hazardous mosquitoes.

I. INTRODUCTION

Lower part of alimentary canal sickness affects more than 256 million particular and causes 1,100,000 dying. One important method against this and various fly insects is mosquito administration that anticipates preventing human-mosquito contact. Some precautions to be taken to prevent fly insects causing diseases and they are, liquid (eg. Insects spray), organic, natural. Continuously using these precautions are become danger so electronic way is used to prevent these insects to make human contact.

There is an interest from people because of safe, various advantages, and effective method. Fly insects like female mosquito causes dengue diseases, battery controlled EMR's has high voltage destroy the insects passing through the mesh. the main persuading angle is that it comes greatly near tennis racquet and something that touches the "strings" on the racket face is passed on to proficient electronic shock and this daze is adequately over to send any bug it comes in handles with it.

II. LITERATURE REVIEW

1. A Review On Mosquito Repellent Methods By EK.PATEL,A.GUPTA

In this review they make clear about control of the mosquitoes, and they furthermore make clear the significant mosquito's control. Mosquito control is main important issue in rising mosquito borne diseases. Main reason for rising of mosquito borne diseases is two components deforestation and industrialization. By reduce the mosquito using mosquito repellent window. Co₂ and lactic present in sweat of warm blooded human beings and animal as a charming substance for mosquito and fly insects. The impression of the aroma is due to chemo-receptors in the wires of fly insects and mosquitoes bug specialist work by covering human smell.

2] Effects of an In-Built Ultrasonic Device On Anopheles Gambiae By OKORIE, P.N, OKAREH, ADEMOWO, O.G.

Intestinal disorders caused by mosquito in Nigeria. Precautions to be taken to remove this disorder have zero results. Remembering objective to make diminishment / transfer of contamination win, there is an approach to control fly insects like mosquito. Ultra sonic technology used for control Gambiae of anopheles.Gambiae S.I mosquito evaluated by adjusting ultrasonic contraption in air conditioner. The range at which ultrasonic device in air conditioner (AC) removed & IAMRAT (Institute for advanced medical research and training) medicine college, Ibadan university, Nigeria, has a peet grady (PG) chamber filled by anopheles gambiae S.I mosquitos . In standard raising condition mosquitos are be like in IAMRAT insectaries.

For test 4 to 6 days old adults are used. AC-UD (Air conditioned ultrasonic device) mounted on test chamber, if control chamber has no AC-UD. Rembering finished objective to center expel rate in device of ultrasonic, female mosquitoes of 60 sucrose carried to test chamber AC-UD. How many mosquitos moved to chamber without AC-ud is recorded from six hours to 24 hours. 50 sucrose female mosquitos introduce into chamber with AC-UD in alternate test. Recording the pound down for 7 hours to 24 hours by count down how many mosquitos on the ground. Test was doing for on & off of AC fan.

3] Mosquito Control and IN Mangalore BY BHAGYA BHASKAR, HEMA NIDUGALA, RAMAKRISHNA AVADHANI

They made a meeting in several cities in Mangalore with some organization and finally they came to realize that mosquito curls, vendor's chemicals in waste funnels are best techniques for controlling mosquito. They recorded fever patients in Mangalore. In 2010 12.067 lacks reported since 2006, 15665, 11931, 5816, 15664, 6635 cases were reported in Mangalore. From these recording we know that 12 passing's in 2008, 10 in 2007 and 7 in 2006. This literature survey by bhagya , avadhani and hema nidugala.

III. METHODOLOGY

A. Concept Development

The principle behind electronic repellent window is the electronic mosquito bat, which is completely different method and styles, customization and that they are

1 Hinge Concept:

Below figure shows the hinge concept, it is very simple and effective method explained with a views as shown in below.

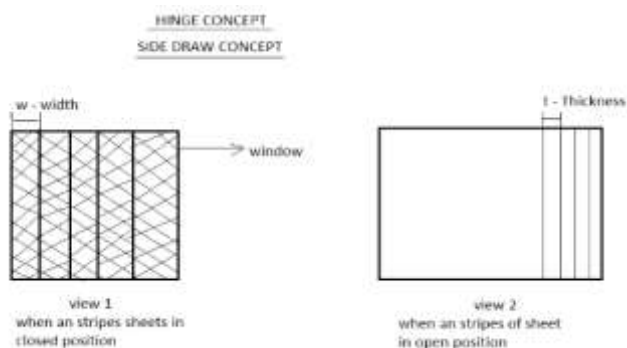


Fig.1 Hinge Concept

Advantages

1. Moderate Manufacturing cost
2. Comfortable to Manufacturing

Disadvantages

1. Not an easy to use idea
2. Due to high swept volume, it is very dangerous.

2 Guide Way Concept:

In this concept guide ways are used to slide the mesh of repellent which is as demonstrated in below figure.

View 1: In first view repellent is in closed position , power is supplied to the mesh so that any mosquito passed through that door is died. This is how mosquito window worked. View one is shown in below figure.

View 2:

In this view we can see that mesh is away from the window with help of guide ways and electricity is off in this stage.

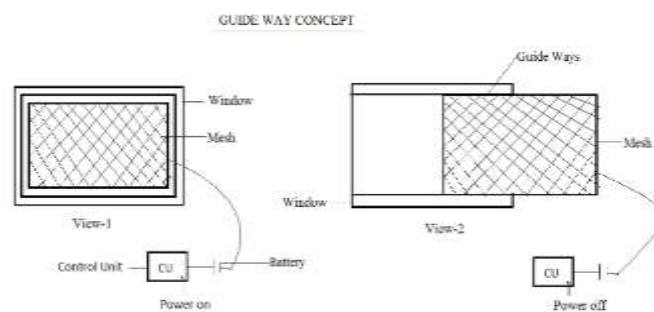


Fig.2 Guide Way Concept

Advantages:

1. Ease to Manufacture.
2. Less cost Required.

Disadvantages:

1. Makes a vague circumstance when to switch on and off the force switch in the genuine time.

3 Roller Concepts:

Below figure shows the Roller concept in which roller is used to slide the repellent mesh as shown below.

View-1:

The Repellent mesh is rolled to close the mesh sheet with the help of roller; this roller is mounted on top of the window as shown below.

View-2:

Network sheet is shut that implies it is moved up roller system.

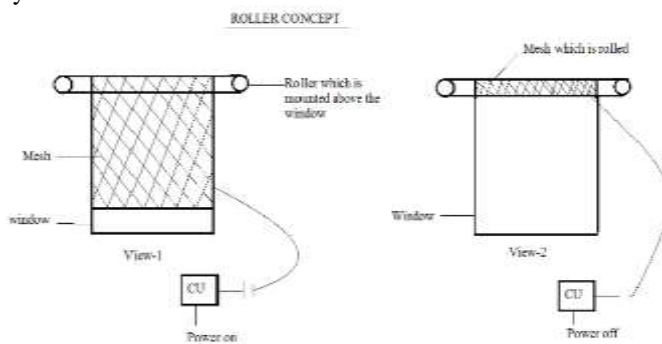


Fig.3 Roller Concept

Advantages:

1. Ease to make Fully Mechanical.
2. operators friendly.

Disadvantage:

1. Wear rate of mesh sheet is faster.
2. Electricity is supplied to roller, when it is mechanical.

4. Curtain Concept:

Curtain concept is a concept where mesh is made to fold in form of curtain and this concept is shown in below figure.

View-1:

As shown in view 1, with the help of automatic sensor (may be infrared and radio waves) mesh is opened or with help of

thread operated by manually. When power is on it prevent the mosquito to entering window.

View-2:

In this view mesh is closed with mechanically or manually.

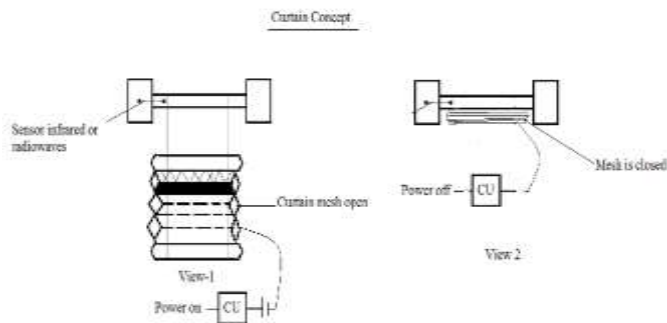


Fig.4 Curtain Concept

Advantages:

1. Not dangerous because no swept volume.
2. Can be Mechanical.

Disadvantages:

1. More expensive than other concept.
2. Manufacturing is not easy to compare other concept.

5. Concept Selection Criteria:

Table.1 Concept Selection

Selection criteria	Concepts			
	Hinge concept	Guide way concept	Roller concept	Curtain concept
Ease of power supply	-	+	0	0
Environmental safety	0	0	0	0
Convenient to operate from both inside and outside of window	-	0	-	0
Manufacturing mesh	0	0	0	-
Bending defects	0	0	-	0
Swept volume	-	+	+	+
Ease of manufacture	-	+	-	-
safer design	-	+	+	+
Score	-5	+4	-1	0
Rank	4	1	3	2
Continue?	No	Yes	No	Revise

From above table we conclude that Guide way concept is better concept which is not have any negative effects for the following criteria. Guide way concept got first rank hence it is a winning concept.

IV. DETAILED DESIGN

4.1. CIRCUIT DESIGN:

The projected circuit of fly insect’s repellent window is as explained below:

Fly insects controlled by electric device circuit is explained with a following points. The shown configuration employs a block generator though tas utilized in joule crook circuits, whereby solely one junction transistor and a middle approach electrical device Execute property oscillation across the 2 winding of the electrical device. R1 together with the planned and also the C1 confirm the frequency of oscillation. R1

Ensures that the junction transistor Inne'er comes among associate degree unsafe zone whereas adjusting the planned. TR1 here could be tinys solid solution core electrical device engineered exploitation the littlest technology style of solid solution core. The winding within the coil is calculated for operating with 3V DC offer, which means The circuit becomes compatible with a 3V battery pack created by putt one or two of Abdominal aortic aneurysm cells asynchronous .When power is applied to the circuit, the junction transistor and also the center abroach Electrical device instantly begin oscillatory at the required high frequency.

This forces the Battery current to pass through the TR1 winding in an exceedingly push pull manner. The on top of shift generates a proportional elicited high voltage across the coil of TR1.As per the winding knowledge, this voltage might be somewhere around 200V.

To additional enhance and raise this voltage to grade which can become appropriate for generating a flying spark, a charge pump circuit involving a Crockcroft-Walten ladder network is employed at the output of TR1.

This network pulls the 200V from the electrical device to concerning 600V.This highVoltage is corrected and applied across a bridge rectifier wherever the voltage is suitably Corrected and stepped up by the 2uF/1KV electrical device. As long because the output Terminals across the 2uFaelectrical device square measure command at some fixed distance, the hold on High voltage energy within the electrical device is unable to discharge, and stays in an exceedingly standby condition. If the terminals square measure bought at a comparatively nearer distance (about one or two of mm) the mechanical energy across the 2uF electrical device becomes capable enough to interrupt the air barrier and arc across the terminal gap within the style of a flying spark. Once this happens, the arcing momentarily stops, till the electrical device charges absolutely to execute another spark, and also the cycle keeps repetition as long because the gap distance is unbroken among the saturable distance of the high voltage.

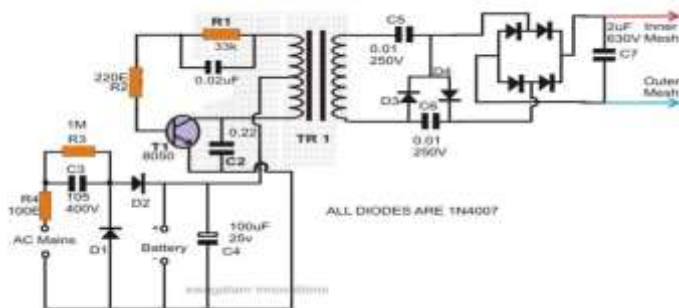


Fig.4.1 Circuit Diagram

Here schematic circuit of inside the bat is shown. This circuit is changed from producers to makers. Trust this followed circuit matches with the above. This overall circuit consists of 3 stages they are

- Power supply / Charging Circuit
- Oscilator circuit
- Voltage booster circuit

4.1.1. Power supply / charging circuit:

This circuit shows that basic power supply which can supply milli amps enough to charge the battery inside. The capacitor constrained the present and voltage is corrected. This voltage is utilized by diodes to produce the dc voltage. This voltage is delivering to charge the battery.

This power supply circuit is as shown in below fig.

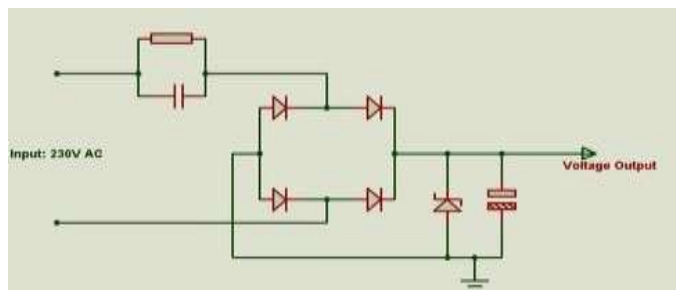


Fig.4.1.1 Power Supply Circuit

4.1.2 Oscillator:

Current is powered through a transistor, which allows the current to pass through necessary curl, this promoting voltage in optional loop and auxiliary loop are instigates voltage in input loop. This counter voltage in the input curl causes the transistor to quit leading and the attractive field in the ferrite center to crumple through electrical vitality from optional loop. This procedure helps the transistor to direct once more, rehashing the procedure and making beat DC. High voltage in the auxiliary loop is promoted by changing attractive field. Voltage prompted in the optional loop relies on upon the proportion of number of turns of Primary and Secondary winding. This voltage will be in the request of a couple of hundreds or thousands. Fig.8 explains oscillator circuit.

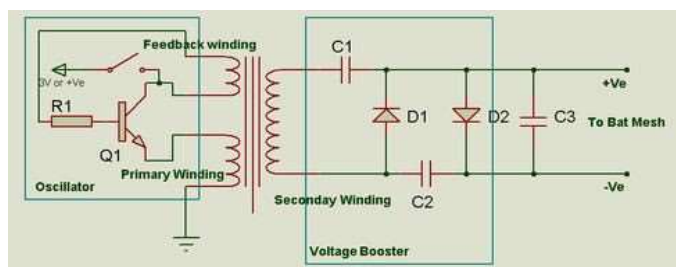


Fig.4.1.2 Oscillator and Voltage Booster Circuit

4.1.3 Voltage Booster:

Here voltage multiplier is occurs which is as shown in above circuit diagram. This voltage utilizes the both diodes and capacitor for multiplier of voltage.

Commonly voltage is tripled, this circuit which triples the voltage through axillary twisting transformer. This voltage flow to the bat through the wire cross section. Among three layers of cross section V_e/GND joined to the external 2 layers and high voltage is passed to the internal layer. Layers are separated such that high voltage is not segment off naturally. In any case When mosquito/bug flies in the middle of, it aides in development of low resistance way, which brings about arcing through the group of the mosquito.

4.1.4 DPDT Circuits:

Schematically representation of DPDT circuit is as shown below figure. DPDT means double pole double Throw circuit. Where common terminals are connected to positive and negative terminals of the 12V battery which is as in figure.

When switch is moved to upper direction common terminals are connected to positive and negative terminals as shown below. When switch is moved down common terminals are connected to negative and positive terminals. Finally when switch is at neutral position common terminals not connected to any terminals of the battery.

4.2 Design of Mosquito Repellent Window Using Guide ways:

Catia software used for creating all the designs Design can be done in different ways using different guide ways among them

4.2.1 Single Guide Way Design:

Single guide way design is as shown in below fig.

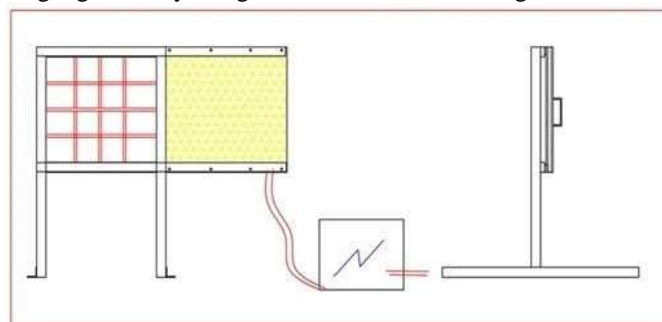


Fig.4.2.1 Single Guide Way Design

Working:

Design is simple easy to manufacture which also a cost effective product .fig contains frame, mesh, control unit, roller guide way. Frame which can be made of aluminum or magnesium or it can also replace by composite material which might increase the cost.

In Fig. yellow colored parts is nothing but a repellent mesh which is reciprocated outside the window with the help of guide ways. The mesh is made of 3 layers

1. A thin metallic mesh which has as comparative small rectangular or round sheet of Lightweight, flexible, vented material attached to a light weight wire. The venting or perforations minimize the disruption of air currents.
2. Second layer acrylic sheet which separates the two mesh parts which prevents the contact of inner and outer mesh.
3. Third layer again a mesh layer which acts as anode to produce high voltage current wave which is sufficient to kill mosquitoes.

4.3 Working of Three Guide Way Design

Single guide ways design disadvantages are solved in three guide way design fig below explain the front vie of three guide way component.

From fig DC motor will be (500 rpm) coupled through C45 coupling bush to 10mm diameter rod, it will be connected to nut, motor is fixed and it is operated through DPDT movementary switch.

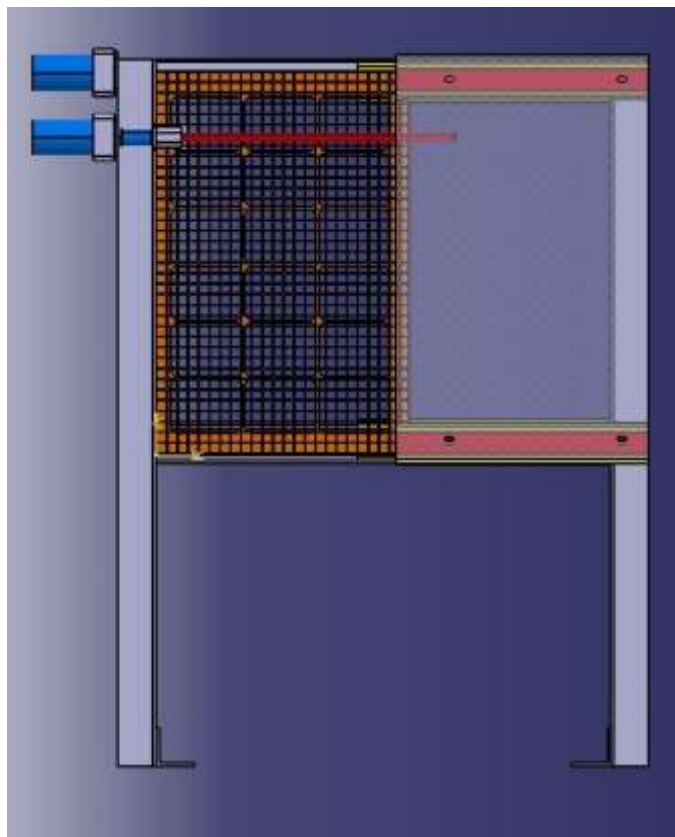


Fig.4.3 Working of three guide way design

Fig contains

1. Two acrylic window
2. one mesh components
3. Guide ways
4. Outer frame
5. DC gear motor
6. Bush
7. DPDT switch

In the above figure two acrylic windows is situated in right side and mesh window is situated at the left side so that there are some views which are explained to explain the working of three guide way design. They are,

- 4.3.1. view-1
- 4.3.2. view-2
- 4.3.3. view-3

These views are explained as follows

4.3.1. View-1

Below figure shows that all the acrylic and mesh doors are situated in right side so that use allowing air to come inside the room. User pushed all guide ways to the right position.

Important point is that , mesh door is in between acrylic doors, not open widely and provide safety. In this view user allowing air particles like dust, air...etc. along with fly insects, housefly... etc into the room.

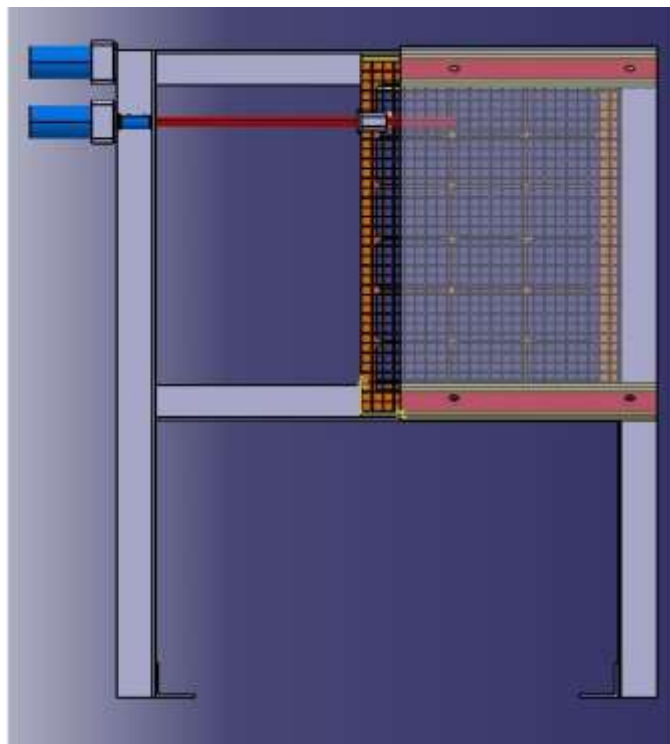


Fig 4.3.1. View-1 of Fly Insects Repellent Window

4.3.2. View-2

As shown in below fig this view explains that one acrylic window is situated to the left side and another acrylic window is situated at the right side along with a mesh according to the user point of views as shown in below figure. Here user closed the all windows to such that who doesn't need fly insects like mosquito, house fly..etc and also air to enter the room. This view is as shown in the below figure.

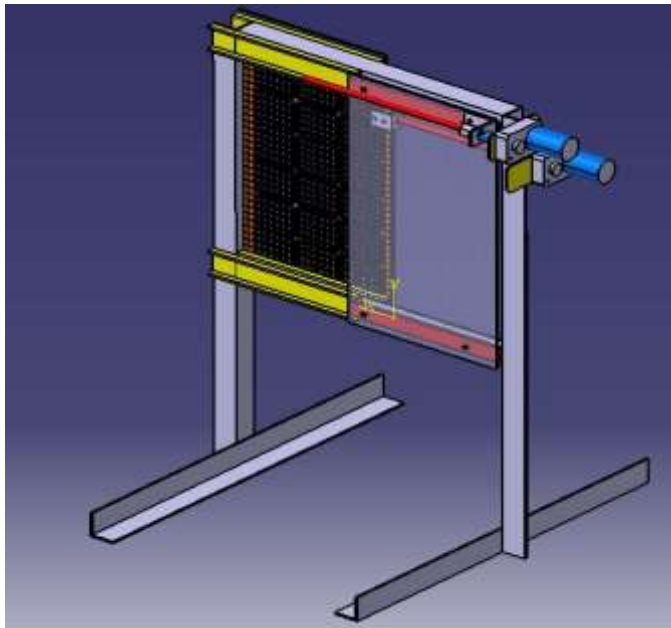


Fig.4.3.2. View-2

4.3.3. View-3

Below figure shows the view-3, in this view mesh window is situated to the left side and two acrylic window is situated to the right side according to the user point of view. User decided to pull the mesh to the left side with a reason that, mosquitoes and other fly insects entering the room must be killed by high voltage and also fresh air from the window has to coming through that window. Anything coming through that window is killed by high voltage hence user rid of from the mosquito problem. This view is shown in below figure.

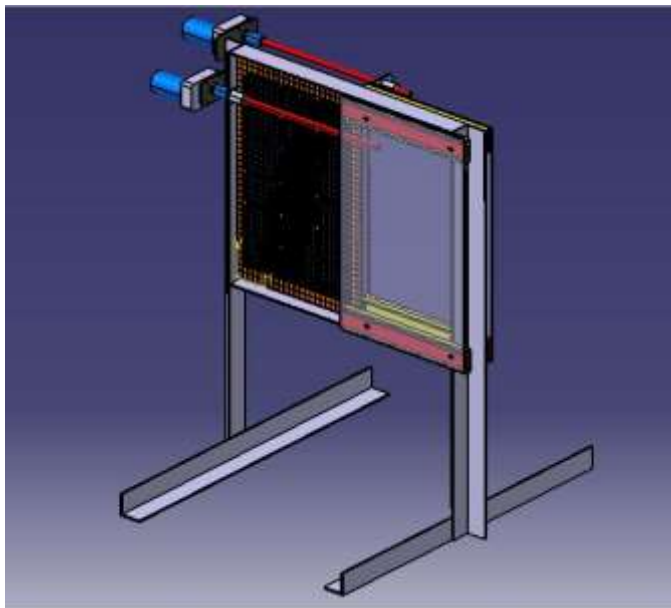


Fig.4.3.3 View-3

4.4 Design Calculation:

Force on nut calculation:

- 1) Formula to calculate the rod force
 $T = F \tan (\alpha + \phi)$
 $\tan \alpha = P / \pi \times d$
 $d = d_o - P / 2$
 $\tan \phi = \mu / \cos \beta$

Where –

T = torque in kg mm, for motor available in market 183.3kgmm,
 F = force available on nut in kg,
 P= pitch in mm,
 do=dia of screw rod in mm,
 $\mu=0.2$,
 $\beta=15$ Degree(helix angle of thread),
 $d_0 = 10$ mm,

$d = 10 - (1.5 / 2) = 9.25$ mm,
 $\tan \alpha = 1.5 / 3.142 \times 9.25 = 0.050259$.
 $\alpha = 2.88$ Degree,
 $\tan \phi = \mu / \cos \beta = 0.2 / \cos 15 = 0.2 / 0.966 = 0.207$,
 $\phi = 11.398$ Degree

$T = F \tan (\alpha + \phi)$
 $183.3 = F \times \tan (2.88 + 11.398)$,
 $183.3 = F \times 0.25443$,
F theoretical = 720.433kgf (approximately)
 But efficiency of motor is 85% and nut efficiency is 35%
F Practical = 183.71 kgf (approximately)

V. OBSERVATION

5.1 Final Developed Product



Fig5.1 Finished look of developed prototype

The three guide way concept is developed into functional prototype which is as shown above figure. AC power source is used for the observations and phone camera is pointed to the mesh to observe the killing of mosquito. Our product killing the many mosquitoes this observation is as shown in below figure.

5.2 Functioning Prototype:



Fig.5.2 Functional Prototype

As shown in above figure blue color light as we seeing is the process of killing mosquitoes so that we conclude that our product is better working. Here clearly when a conductor falls between two mesh sheet materials spark has been jumped which has truly resulted in killing mosquito. Mosquito is burned until the moisture content is completely observed. This functioning of prototype is as shown in above figure.

VI. CONCLUSION

The three guide way design developed is the most eco friendly product with product cost around 6 thousand no need of reapplication once it is installed as compared to natural as well as synthetic method. This method has a good medical hospital advantage. This concept is similar to electronic mosquito bat which works on the same principle but disadvantages of mosquito bat has been eliminated such that no has to wave the window once it is installed.

This product can be customized into different product variants based on the product need and type of window as we all know electronic bat is widely marketed in India even this product can get a same market and which has to be mass produced that helps in reduction of the cost. If the same product is mass produced the cost may fall around few hundred hence repellent window is cost effective solution.

This product should be automated which will decrease maintenance and the main theme of this product is kill mosquitoes and also housefly which enters through window and the main reason of this development was when a person is suffering from malaria and suppose let us consider insect has been bitten to that person and that same insect travels without boundaries resulting in malaria to many few people and when once mosquito repellent window is installed it has pass through that repellent window when all the doors are closed hence achieved by killing mosquitoes when passed through window hence there is a chance of reducing malaria, dengue and many other deadly mosquito diseases we never knew the kind of window is installed in houses of right now hence many

product variants has to be designed to satisfy the customer needs.

A. Scope of Future Work

1. Introduce an optic sensor so that it can automatically pull the window when foreign Material entering window [6].
2. Introduce timer to operate the window so that it should switch on at 6pm and should Automatically shutdown at 6am.[5]
3. Introduce few add-ons in the control panel to attract the mosquitoes such as yellow light, lactic acid pungent smell etc.
4. Introduce the blade type of safeguard for mesh material so that additional protection is added which can also made automatic by radio or infrared waves. [6]
5. As of now our product is using AC current to charge DC battery future work is to develop circuit which will only work using DC battery and which can be replaced when DC battery is drained. This type of circuit design is widely applicable to a area where power cut is most.

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