# Advanced Gaming CAPTCHA for Better Security Concern

## Madhav Chaturvedi [1*], Ankur Taneja [2]

[1*]Dept. of Computer Science, SAM College of Engineering and Technology, Bhopal, India
[2]Dept. of Computer Science, SAM College of Engineering and Technology, Bhopal, India

e-mail: madhav.chaturvedi5@gmail.com, ankurtaneja5@gmail.com

*Abstract*— CAPTCHA (Completely Automated Public Turing Test to Tell Computers and Humans Apart) is a test to distinguish a human from a robot. There are different kinds of CAPTCHA available and there security varies accordingly such as text based CAPTCHA, picture based CAPTCHA, 3D CAPTCHA, Audio CAPTCHA and Gaming CAPTCHA. This paper is based on gaming CAPTCHA and gaming CAPTCHA may have static object and targets, as well as dynamic, but only dragging the object to the target is not supposed to be the best security because nowadays attacking level has been raised. CAPTCHA should be more advanced and analytical for best security in the field of CAPTCHA. This paper proposed an advanced gaming CAPTCHA which is more advanced and analytical or intellectual. And this gaming CAPTCHA is often easy and interactive for human and impossible for robot. This system took the CAPTCHA into another level.

**Keywords**— Gaming CAPTCHA, Puzzle, Robot, Action Script, WAMP Server, MySQL

## I. INTRODUCTION

CAPTCHA stands for Completely Automated Public Turing Test to Tell Computers and Humans Apart is a technique which distinguishes a human from a robot. Turing Test is a kind of a method of enquiry to determine whether or not a computer is capable of thinking like a human being. So that test includes in the technique of CAPTCHA for the identification purpose.

In the proposed work, a kind of CAPTCHA is introduced for which, user needs to play a game to complete the task asked in it by using their logical mind. It is almost impossible for a robot to crack that CAPTCHA as it needs intellectual mind to solve it.

Once a user successfully completed the task instructed in the game that too in the given period of time, the form will be unhide which is attached behind the CAPTCHA. If the user is not able to solve the CAPTCHA, the session will be expired but he/she will get another chance to retry the CAPTCHA.



**Fig. 1.1 Puzzle based Gaming CAPTCHA**

There are so many CAPTCHA technique exist and let it be more precise in literature survey.

## II. PROBLEM IDENTIFICATION

Directly dragging an object to the target is not an intellectual problem to solve a CAPTCHA. Dynamic target and object have different position in each frame but from the very first frame there is a fixed length of movement i.e. 2 cm towards the object. Object is elephant and target is well that can be easily recognized through image processing. Dragging to the entire position of the frame will solve the CAPTCHA within few seconds.

CAPTCHA is based on database; it means that if there is an entry made by game in database will authenticate the user.

SQL injection attack is possible, if an entry is submitted to the URL where form is submitted.



Fig. 2.1 Drag and Drop Gaming CAPTCHA

## III.  PROPOSED WORK

Proposed game is based on intellectual puzzle where user will have to move some vehicles and clear the path of an ambulance from parking to the main road. Proposed work requires intellectual efforts and once the game has been solved within the time limit then it will unhide the form. HTML form is not present in any URL instead of that it is archived with game which can only unhide after successful attempt of solving the CAPTCHA. Proposed CAPTCHA has complex background and secure enough from any unwanted robotic attempt.



Fig. 3.1 Proposed CAPTCHA



Fig. 3.2 Proposed CAPTCHA after Reload or Retry Session

## IV.  PROPOSED METHODOLOGY

- Action script has been used for directing game intellectually.
- Flash provides a .swf file for a game that cannot be edited later or reverse engineering cannot be applied.
- Through java class files a form can be submitted from flash interface to database.
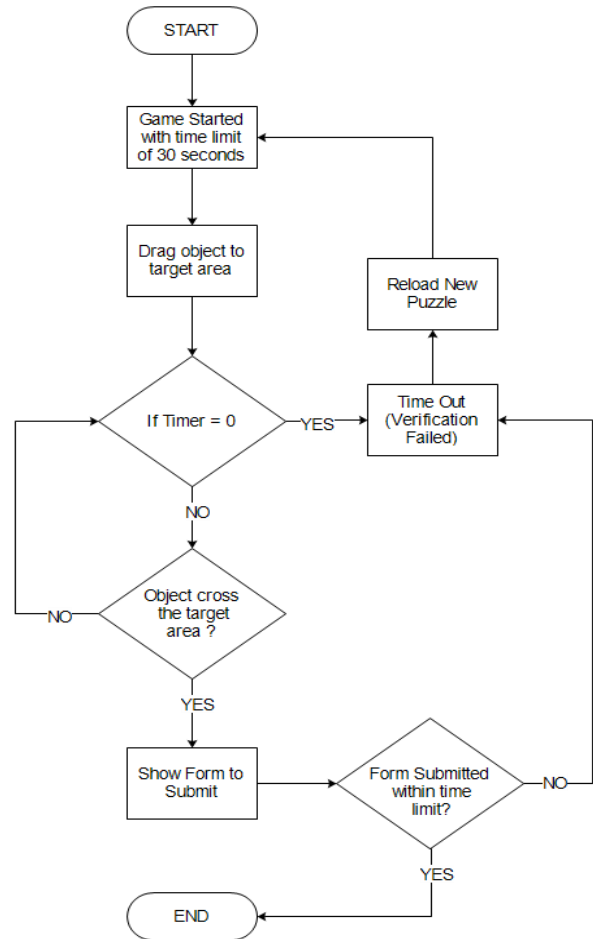- A configuration has been done using PHP MySQL.



Fig. 4.1 Flow Chart

- Proposed game does not possess load on server.
- Hit object restriction and rectangular bounded area has been used to restrict the vehicles to hit another objects.

Let it be more precise with an algorithm.

### 4.1  IC Algorithm (Intellectual Conundrum based Algorithm) -
I.  Initialization :

Initialize $I_A$ as a target object & $T_A$ as a target area

$O_n$ as other objects

II.   If $(I_A)$ hits $(O_n)$   // if target object hits other objects horizontally

{
bound_rectangle.left=
bound_rectangle – $O_n$
bound_rectangle.right= bound_rectangle – $O_n$
}
else
{
bound_rectangle=          bound_rectangle.height&&
bound_rectangle.width
}

II.   If $(I_A)$ hits $(T_A)$ && $(t_n \neq 0)$   // $t_n$ is a game timer if target object hits target area

{
$I_A . x$ += 1;
$I_A . y$ += 1;
all_layers.visible = false;
form.visible = true;
}
else {
mouse_click.enable = false; // Time Out
}

III.   If (form.visible == true) && $(t_m == 0)$ // $t_m$ is a form timer

{
mouse_click.enable = false; // Time Out
form.visible == false;  // form disappeared
}

End

## V.   RESULT ANALYSIS

| USER | TIME RECORDED FOR SUCCESSFUL ATTEMPT OF GAME (In Seconds) | TIME RECORDED FOR SUCCESSFUL SUBMITTING FORM (In Seconds) | FAILED OR SUCCESS TO SOLVE CAPTCHA 1=SUCCESS \| 0=FAILURE |
|---|---|---|---|
| $U_1$ | 15 | 32 | 1 |
| $U_2$ | 13 | 27 | 1 |
| $U_3$ | Time Out | - | 0 |
| $U_4$ | 18 | 35 | 1 |
| $U_5$ | 16 | 30 | 1 |
| $U_6$ | 18 | 29 | 1 |
| $U_7$ | 22 | 40 | 1 |
| $U_8$ | 17 | 36 | 1 |
| $U_9$ | 20 | 31 | 1 |
| $U_{10}$ | Time Out | - | 0 |
| $U_{11}$ | 20 | 35 | 1 |
| $U_{12}$ | 16 | 39 | 1 |
| $U_{13}$ | 25 | 47 | 1 |
| $U_{14}$ | 22 | 38 | 1 |
| $U_{15}$ | Time Out | - | 0 |
| $U_{16}$ | 13 | 26 | 1 |
| $U_{17}$ | 17 | 29 | 1 |
| $U_{18}$ | 23 | 35 | 1 |
| $U_{19}$ | 23 | 33 | 1 |
| $U_{20}$ | 15 | 41 | 1 |
| $U_{21}$ | 19 | 37 | 1 |
| $U_{22}$ | 26 | 39 | 1 |
| $U_{23}$ | 27 | 41 | 1 |
| $U_{24}$ | 17 | 32 | 1 |
| $U_{25}$ | 16 | 38 | 1 |
| $U_{26}$ | Time Out | - | 0 |
| $U_{27}$ | 14 | 40 | 1 |
| $U_{28}$ | 22 | 30 | 1 |
| $U_{29}$ | 24 | 35 | 1 |
| $U_{30}$ | Time Out | - | 0 |

Table No. 5.1 Result Analysis

## VI.   RESULT COMPARISON

| SCEME | PRESENT | PROPOSED |
|---|---|---|
| Total no. of Users (N) | 30 | 30 |
| Total no. Successful Users | 30 | 25 |
| Total no. Unsuccessful Users | 0 | 5 |

| | | |
|---|---|---|
| ∞ (Mean Time) | 10.6 | 19.12 |
| σ (Standard Deviation) | 2.92 | 4.10 |
| $\sigma^2$ (Variance) | 8.57 | 16.86 |
| Minimum Time Recorded | 6 | 13 |
| Maximum Time Recorded | 15 | 27 |

Table No. 6.1 Result Comparison

No failed users at all, it means that game can be solved in each and every attempt which does not require intellectual efforts.

## VII.   CONCLUSION AND FUTURE SCOPE

Thus the Secured Intellectual Graphical CAPTCHA provides most intellectual CAPTCHA till now and it will be better able to recognize whether you are human or robot. This is the new era of CAPTCHA where user will enjoy CAPTCHA along with best security. Intellectual puzzle is always difficult to solve by human, so it is impossible to solve by bots especially in limited time. The current proposed concept of intellectual gaming CAPTCHA can be enhanced in future with more intellectual and artificial problem based CAPTCHA that can be solved within few seconds that would be impossible to solve for robots but easily possible by human with best level of security in the field of CAPTCHA.

### REFERENCES

[1] JingSong Cui, LiJing Wang, JingTing Mei, Da Zhang, Xia Wang, Yang Peng, WuZhou Zhang, "*CAPTCHA Design Based on Moving Object Recognition Problem*", IEEE Transaction, 2009.

[2] Jing-Song Cui, Jing-Ting Mei, Xia Wang, Da Zhang, Wu-Zhou Zhang, "*A CAPTCHA Implementation Based on 3D Animation*", IEEE Transaction, 2009.

[3] Chun-Ming Leung, "*Depress Phishing by CAPTCHA with OTP*", IEEE Transaction, 2009.

[4] Aadhirai R, Sathish Kumar P J and Vishnupriya S, "*Image CAPTCHA: Based on Human Understanding of Real World Distances*", IEEE Transaction, 2012.

[5] Song Gao, Manar Mohamed, NiteshSaxena and Chengcui Zhang, "*Gaming the game: Defeating a game CAPTCHA with efficient and robust hybrid attacks*", IEEE Transaction, 2014.

[6] ArtemShumilov, AndreyPhilippovich, "*Cloud-Based CAPTCHA Service*", IEEE Transaction, 2016.

[7] Vipin Kumar and Atul Barve, "*Dynamic Object and Target based Gaming CAPTCHA for Better Security Analysis*", International Journal of Computer Applications (0975 – 8887) Volume 162 – No 5, 2017.