

Military Captcha¹

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Captcha description

Captcha is a tool that protects websites from internet bot attacks. A detailed description of Captcha will be mentioned below.

What is Captcha

Captcha is an acronym based on the word “capture” and standing for “Completely Automated Public Turning test to tell Computers and Humans Apart”. Captchas are mostly developed for systems which are vulnerable to e-mail spambots, for example Yahoo! Mail or Gmail. They are also developed for systems that provide posting, such as most blogs, forums, chats, etc. Captcha can be designed and made in various ways. Many companies make their Captchas in .Net, PHP or JavaScript. We had chosen JavaScript for our Captcha development.

Purpose of Captcha

The main purpose of Captcha is to distinguish whether you are human being or “bot”. It simply asks you a question that is easy for a human to answer, but impossible for computer to solve. The first Captcha was used on Yahoo! webpages.



Picture 1. Example of Captcha

It was a picture of a curved text where one had to type in some kind of label underneath the Captcha picture. If one succeeded, the webpage sent you on to the desired content, or allowed the completion of the new account.

Development of Captcha

Impossible Captcha

At first people started to make Captchas that were really hard or nearly impossible for computers to solve, but they were almost impossible to solve even by humans.

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Password (required)

Birthday (required)
March 31 1981

Human test (required)
Type in the text you see in the box below.

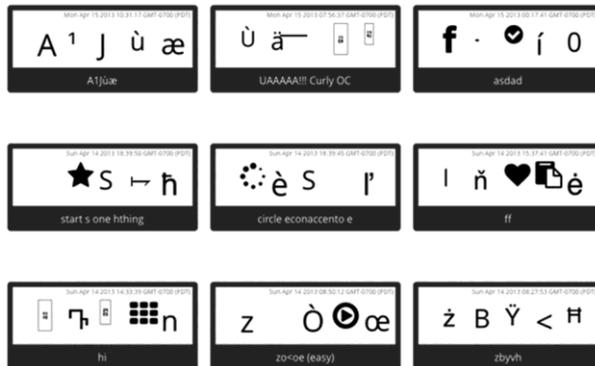


Sorry, your text and the image didn't match. Please try again.

Read (really!)
 I have read and agree to the **Terms of Use** and **Privacy Policy**.

Picture 2. Impossible Captcha

The illustration above displays an impossible Captcha, one where the main intent is not to make the question that hard. Although there is one kind of Captcha that is specialized at making the task impossible to solve. It is called Crapcha (Completely Ridiculous and Phony Captcha that Hassles for Amusement).



Picture 3. Example of Crapcha

You have requested <http://rapidshare.com/files/104063280/978-1588295019.rar> (3940 KB).

- Download via GlobalCrossing #2
- Download via GlobalCrossing
- Download via Level(3) #4
- Download via Cogent #2
- Download via TeliaSonera #2
- Download via Level(3) #2
- Download via Teleglobe
- Download via Level(3)
- Download via Level(3) #3
- Download via Cogent
- Download via TeliaSonera

No Premium User. Please solve the Riemann Hypothesis.

$$\pi(x) - \int_0^x \frac{dt}{\ln(t)} = \mathcal{O}(x^{1/2+\epsilon}),$$

Solution: [Download via Teleglobe](#)

Picture 4. Math Captcha

Pix Captcha

Many different kinds of Captcha were invented. The main goal is to make the easiest question for a human, but that a computer cannot solve. That was when picture Captcha were created, it is called Pix-Captcha. It is short form for Picture Captcha.



Picture 5. Picatcha—Pix—Captcha

This Captcha asks you to mark a specific picture, or specific group of pictures. Pictures are generated randomly and do not look the same. For example you have to mark all clocks, pix-captcha generated 8 pictures two of them are clocks one is digital and the second is an-

alog, the rest of the pictures can be anything. The computer does not know how these clocks that you have to mark should look like, but you can easily mark the two pictures that display clocks.

More accessible Captcha

There were many attempts for more accessible Captchas. First people tried to do some kind of Captcha for people with disabilities, mostly visual. More accessible Captcha involved questions like: “How much is 1+2”, or “What color is the sky?”. Questions that are impossible for computers to solve. But these kinds of Captcha may worsen accessibility for people with intellectual and mental disabilities, for instance dyscalculia. The biggest effort is on making a central server which is shared with many sites.

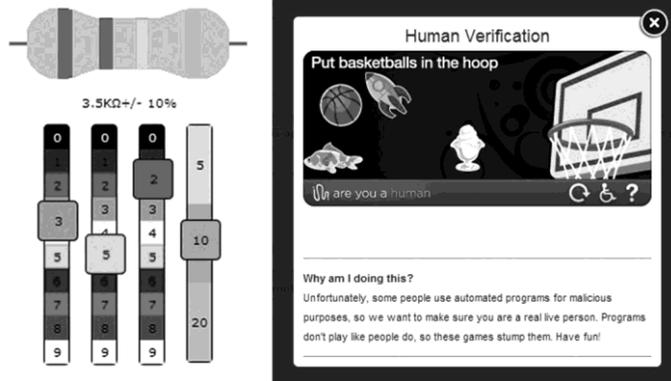


Picture 6. Sound Captcha(left), Original Captcha(right)

This server provides Captchas on websites, all of them generated randomly, and not only the text-based Captchas, but also visual, motor, cognitive and hearing kinds of Captcha. This could eliminate problems for people with mental, intellectual, visual, etc. disorders. The picture above displays the sound and the original, mostly used Captcha. The displayed text could be unreadable for some, and impossible to type correctly.



Picture 7. 3D Captcha before test and after test



Picture 8. Resistor Captcha and Game Captcha

Kinds of attacks

Attackers usually try to get attention somehow. And there are various ways to accomplish that. There are various forms of getting attention done by attackers such as:

- Seeing something that has not been seen yet,
- Showing funny and interesting or even shocking content,
- Possibility of getting something for free,
- Declaring the reader a winner of some kind of competition,
- Showing any kind of nudity.

People are easily manipulated and usually do not recognize this kind of thread. The main groups of interest for attackers are elderly people or young people. Groups that are not educated enough in Information Technologies.

“Bots”

But there are also other forms of attacks that can cause server overload. This can be caused by robots. A robot is a computer program that does some cycling processes over and over again, till the goal is reached. It usually collects data or fulfills requirements until accomplished and it is necessary to continue. And even within this branch there are many variations of these robots (they are called “bots”). There are few examples of bots:

- Spambots,
- Gatherers,
- Chatterbot,
- Botnet.

Spambots: this bot will send unwanted emails to your email address. Spambots can simply get your email address anywhere you type it, they register a string with a “@”, and after “harvesting” your email they just save your address and send spam to you.

Gatherers: they come through web pages and collect links of new web pages. These collected links can be used for consecutive exploration.

Chatterbot: It is a kind of spambot, the difference is that this bot sends you unwanted messages, not emails. This bot spams users in chat applications.

Botnet: It is a network of interconnected bots on virus–infected computers. Bots are waiting for commands from owners who own this kind of virus–infected computer. They simply do what the owner tells them to do.

Characteristics of the solution

Military Pix–Captcha — Military means that this kind of Captcha is primarily designed for people who work in military branches. But it can also be used by users who are not educated in knowledge of military ranks. Military Pix–Captcha has many utilizations. For example at forums, specifically in situations when you want to create, edit or delete new posts. Whenever you want to do such actions, Captcha will occur and wait for its solution. In another way you will be unable to proceed with such action. It can be also used at a contact form, where it appears right before successfully sending your contact information.

For whom is Military Captcha intended

Although Pix–Captcha is modern and an easily solved kind of Captcha it is not commonly used. Problems appear in situations when blind people would want to access pages that use this kind of Captcha. It is designed for military personnel and even for people that are not familiar with military ranks, but not for handicapped or injured people, or who have visual disorders or disabilities.

Military Captcha development

Randomly generated pictures

Simple image array is used in which are inserted all pictures of military ranks concerning one national type of ranks. One image array means only one image is generated randomly. We have chosen three randomly generated pictures so we have three arrays. Pictures containing military ranks are saved in a specific folder. This must be mentioned, because functions that generate these pictures randomly need the exact paths of these pictures. The path is saved into a variable called “imlocation”. So there are three functions which generate pictures randomly, each for one array. Functions are refreshed every time you refresh your web page, so each time you refresh your web page, you will get three different pictures. Before pictures are shown to the user, there is an “If else” statement that oversees this problem. It simply says: “Generate pictures as long as all of them are different from each other and until that, do not show me the pictures”.

```
if(((image1[image1_number])!=(image2[image2_number]))
&&((image1[image1_number])!=(image3[image3_number]))
&&((image2[image2_number])!=(image3[image3_number]))
)
```

Picture 9. Condition for different picture appearance

Randomly generated text

We used simple labels in which there is shown which one you have to mark for passing Captcha. We solved this similarly to the problem with the pictures. I have chosen a function that involves array of text. In this case military ranks are in the form of a text. Again, titles are randomly generated.

Mutual comparison

We decided on mutual comparison. This means that it is necessary to have a simple algorithm that compares text and name of the picture, to see whether one's indication is correct. All of the pictures have their own names based on ranks that they show. We made a function that cut out a specific part of the file name. This specific part involves the whole title of the rank, but does not involve filename extension, but how to ensure cutting out the filename dynamically? It can be easily made by saving the length of text that has been randomly generated into a variable, followed by putting this variable as a number into a function that cut out a wanted string. Now the function knows in what range it has to cut.

```
var label1 = document.getElementById("Match").value;
var delka = label1.length;
var label2 = label1.substring(0,delka);
```

Picture 10. Function for finding proper length of picture title

Now we know the exact length of string that we are looking for.

Picture marking



Picture 11. Military Captcha

At first we wanted to make the indication animated. But it would only complicate the structure of source code and worsen the functionality of Captcha. Also, there are various problems with different appearances of the same code in different browsers. So we decided to solve this problem by showing a border around the picture that one has to click on. We solved this exact part by involving jQuery in the source code. The picture is shown in div of dedicated scale, position, color and name. After clicking on the picture the border is shown around the div, not the picture. This action made the picture move. From a visual side, there was no problem, but it did not have a good aesthetic appearance. We wanted to make all the divs immobile and not influenced by changing scale after marking them with a border. We changed markings by border, by marking the picture with shadows after a click. That is the way to make div immobile after marking it. We chose a scale of fifteen pixels for the shadow. The color of the shadow is red, so it is easy to recognize which picture is the one marked. A few problems were solved, but many others showed up.

After marking a picture one can change one's mind and want to mark another one. It does not sound like a big deal, but after marking a new picture one needs to unmark the old one. The solution we have described above made the pictures marked, not unmarked when one selected another picture. We had to upgrade click function with variables which indicate whether the other div is selected or not.

Help button

Military Captcha is supposed to be accessible even for people that are not familiar with military ranks. Due to this problem it was necessary to add a help button that shows all ranks of the chosen nationality. The button is situated underneath the national flags. The new window displaying military ranks will open after clicking on this button.

NATO	Hodnost	Vizuální zobrazení
OR-1	Vojín	
	Svobodník	
OR-2	Desátník	
OR-3	Četař	
OR-4	Rotný	
OR-5	Rotmistr	
OR-6	Nadrotmistr	
OR-7	Praporčík	
OR-8	Nadpraporčík	
OR-9	Štábní praporčík	
OF-1	Poručík	
	Nadporučík	
OF-2	Kapitán	
OF-3	Major	
OF-4	Podplukovník	
OF-5	Plukovník	
OF-6	Brigádní generál	
OF-7	Generálmajor	
OF-8	Generálporučík	
OF-9	Armádní generál	

Picture 12. Military ranks — Czech Republic

NATO	Rank	View	NATO	Rank	View
OR-1	Private		OF-1	Second Lieutenant	
OR-2	Private			First Lieutenant	
OR-3	Private First Class		OF-2	Captain	
OR-4	Specialist		OF-3	Major	
	Corporal		OF-4	Lieutenant Colonel	
OR-5	Sergeant		OF-5	Colonel	
OR-6	Staff Sergeant		OF-6	Brigadier General	
OR-7	Sergeant First Class		OF-7	Major General	
	Master Sergeant		OF-8	Lieutenant General	
OR-8	First Sergeant		OF-9	Colonel General	
	Sergeant Major		OF-10	General of the Army	
Command Sergeant Major					
Sergeant Major of the Army					

Picture 13. Military ranks — United States

NATO	Hodnosť	Vizuálne zobrazenie
OR-1	Vojak 1. stupňa	
	Vojak 2. stupňa	
	Slobodník	
OR-2	Desiatnik	
OR-3	Čatár	
OR-4	Rotný	
OR-5	Rotmajster	
OR-6	Nadrotmajster	
OR-7	Podpráporčík	
OR-8	Práporčík	
OR-9	Nadpráporčík	
OF-1	Poručík	
	Nadporučík	
OF-2	Kapitán	
OF-3	Major	
OF-4	Podplukovník	
OF-5	Plukovník	
OF-6	Brigádny generál	
OF-7	Generálmajor	
OF-8	Generáporučík	
OF-9	Generál	

Picture14. Military ranks — Slovak Republic

NATO	Ranksorban	Vizuális megjelenítés
OR-1	Honvéd	
OR-2	Őrvezető	
OR-3	Tizedes	
OR-4	Szakszvezető	
OR-5	Őrmester	
OR-6	Törzsőrmester	
OR-7	Főtörzsőrmester	
OR-8	Zászlós	
OR-8	Törzszászlós	
OR-9	Főtörzszászlós	
OF-1	Hadnagy	
OF-1	Főhadnagy	
OF-2	Százados	
OF-3	Őrnagy	
OF-4	Alezredes	
OF-5	Ezredes	
OF-6	Dandártábornok	
OF-7	Vezérőrnagy	
OF-8	Altábornagy	
OF-9	Vezérezredes	

Picture15. Military ranks — Hungary

Web implementation

As you can see, there are flag icons representing each state individually. It is there only for testing purposes and it is not going to be in the web version. The implemented version is supposed to appear right after one wants to send post or information where one has filled in a contact form. These are two main but not exclusive domains where Captcha could be used. Unlike the testing version, the implemented version will not let you change nationality while answering a question. There will be an option that will let you choose from the list of nationalities. Nationality selection will be presented by a selection file containing all nationalities.

Posting

One of many domains where Captcha could be implemented is at forums, mainly due to a higher possibility of bot attacks. Problems occur right before the successful posting of a contribution. That is the weakest part in forum security, and Captcha helps strengthen this weakness by implementing itself.

The program should be used in situations such as sending your post to a forum, just after clicking the submit button. Your post is held right after clicking and Captcha pops up, the rest of the screen is blacked out and the only accessible part of the screen is Captcha. The content of the webpage is accessible and you or the robot has to answer the question that Captcha wants solved. The only thing that allows continuation is solving the question.

Sending

Sending has similar principles as posting has, but with the difference that sending is not viewed on the webpage. This applies to contact forms that allow admins and also robots to get personal information. As mentioned before, sending has a principle which is similar to posting. It includes a button, but its main purpose is calling, the function that shows Captcha and hides the website content.

Web browser and nationality support

Captcha was developed and tested on Google Chrome, on which it is fully functional. Also it is working properly in other browsers like Mozilla and Firefox. The only problematic browser is Internet Explorer, which does not support a svg file format. In the current situation Military Captcha supports three nationalities: Czech, American, Slovak and Hungarian. These involve ranks and Captchas in the native language for each state individually.

Implementation possibilities

Military Captcha could be used on websites of the Czech army: <http://www.army.cz/>. Implementation at school intranet is also possible.

Other possible ways of Captcha usage

On the other hand, despite security purposes there is an option to use Captcha as educating material.

Security elements

Right-clicking is not allowed after Captcha appearance. This represents a simple prevention against potential abuse. The main reason is to limit a robot's options of abuse to the maximum. After wrong indication, followed by unsuccessful checking, the Captcha will reload itself.

Possibilities of future development

Expansion

Due to multinational influence, national expansion is necessary. The number of French soldiers in our institution has risen, due to this French Captcha is needed.

Education

Captcha could be also used for educating. The program should be accessible for every student at university webpages. Upgraded by an option menu where you can select difficulty and number of questions, plus nationality selection.

Resources

- [1] Wikipedia contributors. Internet bot. Wikipedia, The Free Encyclopedia. Available at: http://en.wikipedia.org/w/index.php?title=Internet_bot . (accessed: 11 11 2013)
- [2] Wikipedia contributors. CAPTCHA Wikipedia, The Free Encyclopedia. Available at: <http://en.wikipedia.org/w/index.php?title=CAPTCHA>. (accessed: 11 11 2013)
- [3] Wikipedia contributors. Military rank. Wikipedia, The Free Encyclopedia. Available at: http://en.wikipedia.org/w/index.php?title=Military_rank. (accessed: 11 11 2013)