CAPTCHA: Securing the Digital World

Names	Supervisor
Abdulazeez Qusay	Chewan Jalal
Mustafa Musab	
Ibrahim Qahtan	
Kozhin Kamal	

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What is CAPTCHA?

CAPTCHA stands for *Completely Automated Public Turing test to tell Computers and Humans Apart*.

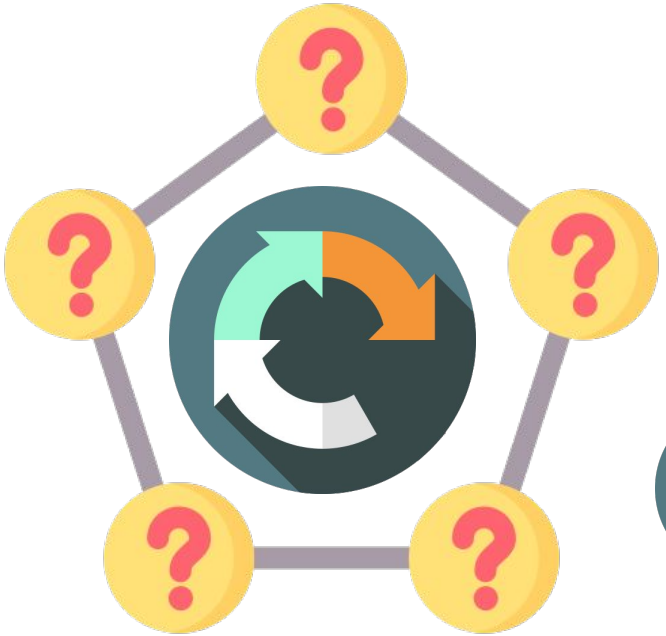
Key Point: CAPTCHA prevents bots from misusing online services by challenging them with tasks humans can solve but bots cannot.

History of CAPTCHA

2000	CAPTCHA concept introduced by Carnegie Mellon.
2009	Google acquired reCAPTCHA.
2018	Invisible CAPTCHA (reCAPTCHA v3) launched.

Why CAPTCHA is Important?

Infographic on cyber attacks stopped by CAPTCHA.



Protects against spam submissions, brute force attacks and fake account creation.

over 25% of internet traffic is attributed to malicious bots.

Types of CAPTCHA

Text-based CAPTCHA

Image-based CAPTCHA

Audio CAPTCHA

reCAPTCHA (v2 & v3)

Behavioral CAPTCHA.

Visual

Strengths of CAPTCHA Types

Text-based
Simple, quick to implement

Image-based
Visual, engaging

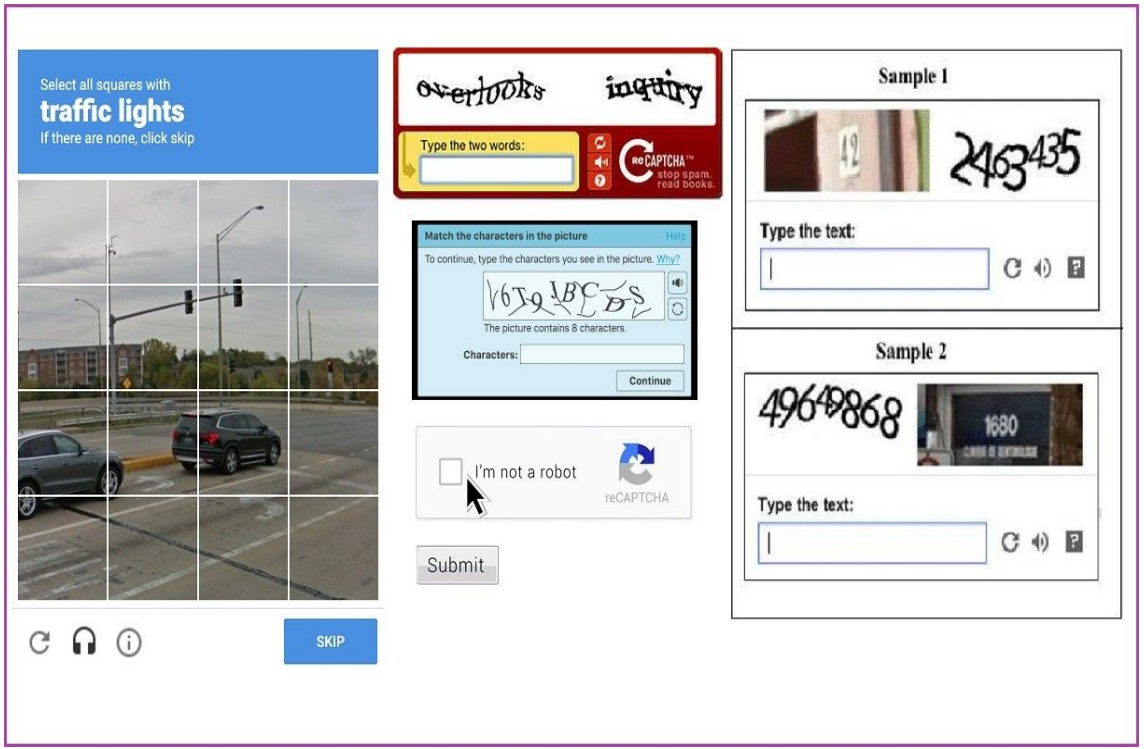
Audio
Inclusive for the visually impaired

reCAPTCHA
Advanced, user-friendly

Weakness of CAPTCHA Types

1. **Text-based** Bots are improving at solving
2. **Image-based** Accessibility issues
3. **Audio** Can be hard to understand
4. **reCAPTCHA** Privacy concerns (data tracking)

Demonstration of CAPTCHA



Important Questions:
How AI is both solving and improving CAPTCHA?

Statistics: Over 90% of CAPTCHAs can be solved by advanced bots

In short: AI challenges CAPTCHA security while also advancing it to be smarter and more user-friendly

Challenges in CAPTCHA

Accessibility
Difficult for visually/hearing impaired users

Bot Advancements
AI-driven bots can solve traditional CAPTCHAs

Usability
Frustration for users → Increased bounce rates

Innovations in CAPTCHA

Behavioral Analysis
Monitors mouse movements, click patterns

Invisible CAPTCHA
Users never see it; works behind the scenes

Biometric CAPTCHA
Facial recognition or fingerprint scanning

Visual
Show examples of innovative CAPTCHAs

Future of CAPTCHA

AI Integration

Smarter CAPTCHAs using AI to detect user behavior and intent

Biometric Verification

Incorporating facial recognition, fingerprints, or voice IDis actually a cold place

Accessibility Improvements

More inclusive designs for visually and hearing-impaired users

Invisible CAPTCHA

Fully hidden tests that evaluate interactions without user input

CAPTCHA -Text Type- Python Code

```python
from PIL import Image, ImageDraw, ImageFont
import random
import string

def generate_simple_captcha(width=200, height=70, font_size=36):
    # Step 1: Generate a random string
    captcha_text = ''.join(random.choices(string.ascii_letters + string.digits, k=6))
    # Step 2: Create a blank image
    image = Image.new('RGB', (width, height), 'white')
    draw = ImageDraw.Draw(image)
    # Step 3: Select a font
    try:
        font = ImageFont.truetype("arial.ttf", font_size)
    except IOError:
        font = ImageFont.load_default()
    # Step 4: Draw the text in the center of the image
    text_bbox = draw.textbbox((0, 0), captcha_text, font=font)
    text_width = text_bbox[2] - text_bbox[0]
    text_height = text_bbox[3] - text_bbox[1]
    text_x = (width - text_width) // 2
    text_y = (height - text_height) // 2
    draw.text((text_x, text_y), captcha_text, font=font, fill='black')
    # Step 5: Save or display the image
    image.save('simple_captcha.png')
    print(f"Captcha text: {captcha_text}")
    image.show()
# Generate the CAPTCHA
generate_simple_captcha()
```

Thanks

Any Question?