CEASEFIRE

Advanced versatile artificial intelligence technologies and interconnected cross-sectoral fully-operational national focal points for combating illicit firearms trafficking

The EC-funded Horizon Europe **CEASEFIRE** project (2022-2025), improves the crime-fighting ability of European nations using modern technology. It brings together 7 companies, 5 research organizations and 9 Law Enforcement Agencies (LEAs) from all over Europe.

Coordinator:
Centre for Research and Technology – Hellas (CERTH, Greece)

Consortium:
14 Countries, 21 Partners

Duration:
36 Months

Start Date:
October 2022

Use-Cases:
5

Type:
Innovation Action

Goal:
Combat firearms trafficking using advanced Artificial Intelligence (AI) and Information & Communication Technologies (ICT)

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The challenges

Trafficking of illicit firearms funds and arms organized crime. LEAs trying to combat firearms trafficking face difficult challenges that were not even conceivable just a few years ago.

- Modern criminals use illegal, hard-to-monitor and volatile **Dark Web** marketplaces.
- **Cryptocurrency** transactions provide anonymity in illegal exchanges.
- Involved parties coordinate via the regular **"Surface" Web** and social media.
- **3D printing** technology allows easy digital distribution of weapon **blueprints**.
- Modern criminal groups utilize **regular post and courier services**, concealing guns among licit goods within mailed parcels.
- **In-the-field identification of seized weapons** is a real challenge for LEAs:
  - Extremely high diversity in firearm appearance.
  - Possible erasure of serial numbers by criminals.
  - Lack of specialized LEA practitioner training.

The pillars

CEASEFIRE exploits AI and digital technologies to assist LEAs. It is structured around 5 key pillars:

Pillar 1. Develop **innovative, advanced, AI-powered technologies** to boost LEA authorities in tackling firearms trafficking criminal activities.

Pillar 2. Enhance **trans-national, cross-disciplinary, multi-agency, operational cooperation and information exchange** among LEAs.

Pillar 3. **Conduct criminological analysis** of the phenomenon and **ensure compliance** with European legal/ethical norms.

Pillar 4. **Foster the adoption of advanced technologies** in current operational environments, through **hackathons, training activities** and **pilot studies**.

Pillar 5. Engage in **intense dissemination, community building** and **exploitation planning** activities.

The technologies

The digital tools contained in the CEASEFIRE system are powered by advanced algorithms.

Web Crawling. Configurable and AI-assisted Web crawlers allow LEA users to easily retrieve data relevant to firearms trafficking from on-line sources.

Computer Vision. Automatic analysis of various types of images, ranging from regular photographs to 3D printing blueprints or X-ray scans of mailed parcels.

Natural Language Processing. Automatic analysis of various text snippets (e.g., taken from on-line forums), language translation, etc.

Graph Analytics. Graph modelling and analysis powers various CEASEFIRE functionalities:

- Automated cryptocurrency transactions analysis.
- Data fusion and correlation estimation.
- Reconstruction of criminal networks.

Use-cases and tools

Use-Case #1: Real-time systematic firearms incident and intelligence information collection and exchange.

A CEASEFIRE digital application enhances the **intelligence picture** of LEAs on firearms trafficking at a pan-European level. Based on periodic **retrieval of information** from on-line news articles and advanced AI, such as **Natural Language Processing**, it automates organization of incidents in a structured manner and in near-real-time, while facilitating **risk indicators, red flags** and inter-LEA **exchange of strategic intelligence**.

Use-Case #2: On-the-spot firearm seizure registration and cross- border data search.

A CEASEFIRE tool assists LEA officers in crime scenes during **firearms seizures**. An officer takes photographs using a **mobile** device, which then **analyzes the photos** to identify the characteristics (e.g., model, caliber, serial number location) of seized firearms using advanced AI, such as *Deep Neural Networks* for **computer vision**. The mobile app can transmit reports to the central CEASEFIRE system database for **further cross-analysis**.

Use-Case #3: Firearms purchase on Dark Web marketplaces.

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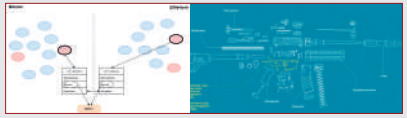
Use case #5: 3D-printed firearm blueprints distribution.



A set of interrelated CEASEFIRE digital tools allows detection of **Dark Web transactions involving firearms** or related **cryptocurrency payments**, identification of Web user **discussions about firearms**, as well as **monitoring the distribution of blueprints for 3D-printed firearms** in on-line forums.

State-of-the-art **Web crawling, computer vision, Natural Language Processing** and **graph analytics** methods power automatic **analysis of suspicious images** that may depict relevant objects, automatic analysis of text from Dark Web marketplaces and Web forums, **recognition of patterns/correlations** concerning illicit firearms tracking within **cryptocurrency transaction graphs**, as well as targeted **automatic retrieval** of relevant data from on-line sources.

Use-Case #4: Mail order and courier service firearms trafficking detection using scanning technologies.

A CEASEFIRE digital tool supports customs officers who use **scanning equipment** to take **X-ray images** of **mailed parcels**. A friendly **desktop application** performs **on-demand detection** of firearms, firearm components and ammunition on these X-ray images using advanced AI, such as *Deep Neural Networks* for **computer vision**. The application can transmit reports to the central CEASEFIRE system database for **further cross-analysis**.

Summary

Illegal arms trafficking is a major challenge for European society and law enforcement. CEASEFIRE represents a concerted EC-funded effort towards facing this threat, by putting state-of-the-art technology to good use.

CEASEFIRE Website:
https://ceasefire-project.eu/

CEASEFIRE LinkedIn:
https://www.linkedin.com/company/ceasefireproject/

CEASEFIRE Facebook:
https://www.facebook.com/people/CEASEFIRE-Project/100089862614779/

CEASEFIRE X/Twitter:
https://twitter.com/CEASEFIREHE

CEASEFIRE Youtube:
https://www.youtube.com/@CeasefireProject

Coordinated by Centre for Research and Technology – Hellas (CERTH).
Contact: Georgios Stavropoulos (stavrop@iti.gr)

Any relevant stakeholder (LEAs, security-related EU/national/international bodies and initiatives, related EC-funded research projects, SMEs active in security products/services, etc.) are welcome to join the CEASEFIRE community, in order to receive regular updates, news and invitations from the wider security ecosystem!

You can subscribe easily at https://ceasefire-project.eu/community/. All personal information are kept internally within CEASEFIRE, adhering to the highest privacy standards.

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