ESTIMATION, TRACKING & FUSION LAB.
&
OPTIMIZATION AND NUMERICAL ANALYSIS LAB.

ANKARA UNIVERSITY
ANKARA, TURKEY

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Who are we?

- Ankara University, being the first university of the Republic of Turkey, aims to sustain its pioneering identity through its qualified scientific research and education studies.

- Estimation, Tracking and Fusion Laboratory was established in 2004 by Dr. Murat Efe.

- Optimization and Numerical Analysis Laboratory was established in 2010 by Dr. A. Egemen Yilmaz

- Main research interests lie in the areas of detection, tracking, fusion, optimization, autonomous systems and smart Technologies.

- Ankara University Smart Systems and Technologies Research Center is on the way (Approval received, necessary bodies are being formed).

- Members:
  - Dr. Murat Efe
  - Dr. Gokhan Soysal
  - Dr. Ali Onder Bozdogan
  - Res. Asst. Hakan Sac
  - Res. Asst. Baris Satar
  - Res. Asst. Sumeye Nur Karahan

- Members:
  - Dr. Asim Egemen Yilmaz
  - Dr. Ahmet Akbulut
  - Dr. O. Tolga Altınoz
  - Res. Asst. Sultan Can

Research Interests

Some of the Projects Carried Out by the Research Teams

- Tracking and fusion algorithms for air defense radar (completed)
- Observed Information Matrix Based Sensor Management Approach (completed)
- GSM Based Passive Radar Prototype (ongoing)
- Multiobjective optimization approaches for general assignment problems (completed and ongoing).
- Precise positioning approaches (w/wo GPS) as a first step to autonomous vehicles (ongoing)
- Post disaster early phase resource and aid optimization (completed)
- Optimization and management for emergency medical services – ambulance location/relocation, traffic light management, route optimization etc.)(ongoing)
- Rostering and scheduling optimization for public transport (ongoing)

Our Capabilities at a Glance

Tracking and Data Fusion

- Detection both from raw and pre-processed sensor data

- Signal processing and filtering algorithms for tracking and fusion applications

- Realization of low and high level data fusion approaches in real life systems

- Resource management

Optimization

- Multi-objective metaheuristic optimization yielding multiple alternative plans considering multiple criteria

- Dynamic hard/soft constraint handling considering the availability and usability of assumed resources and infrastructure after the disaster

- Stochastic modelling of the impacts of the disaster on the availability and usability of the resources and the infrastructure

- Utilization of parallelization techniques in order to achieve the solution(s) in reduced time

Relevant Topics and Past Experience

- Our team is experienced in conducting/collaborating in research projects both at national and international level.

- In 2015 the Lab submitted a proposal as a coordinator called `Passive Surveillance System for Maritime Border Security (PasSurvS)` for the topic BES-02-2015:Maritime Border Security topic 2: Environment friendly maritime surveillance systems.

- Our research team would add value to any consortium as a partner under
  - *Smart Cities and Communities,*
  - *Towards operational forecasting of earthquakes and early warning capacity for more resilient cities*
  - *Testing, validation and certification procedures for highly automated driving functions under various traffic scenarios based on pilot test data*
  - *Support for networking activities and impact assessment for road automation*

  topics with its years of experience in

  - Data fusion
  - Optimization
  - Resource management
  - Signal processing

Relevant Calls

- LC-MG-1-2-2018: Sustainable multi-modal inter-urban transport, regional mobility and spatial planning.
    - Use of geolocalization data, including Galileo and EGNOS for cooperative mobility in combination with other communication and telematic data to foster a more efficient use of infrastructure and reduction of air pollution.
    - Innovative planning concepts (e.g multi-state planning, performance-based planning, scenario techniques and community planning) should also be considered with the aim to ensuring accessibility, social justice and equity in the mobility of all citizens groups. Coordinated infrastructure development: balancing long-term environmental goals with other development aims (e.g. effective land use and preservation of natural zones), developing environmental high-performance infrastructure (e.g. light rail), upgrading/ repurposing existing infrastructure, improving connectivity to the TEN-T and overall resilience of the region.

- LC-SC3-EE-4-2019-2020: Upgrading smartness of existing buildings through innovations for legacy equipment
    - Proposals should demonstrate how the smart systems, smart controls and smart appliances can be integrated seamlessly in existing buildings to interface and/or to control the major energy consuming domestic appliances that are already installed.

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