Doctoral School of Information and Biomedical Technologies Polish Academy of Sciences

Domain: IT

Research area: Next Generation Internet of Things; based on Autonomic Computing and Frugal AI

Supervisor(s), contact: Marcin Paprzycki/Maria Ganzha
{marcin.paprzycki,maria.ganzha}@ibspan.waw.pl

Assistant supervisor(s), contact: Katarzyna Wasielewska katarzyna.wasielewska@ibspan.waw.pl

Place of research: Systems Research Institute Polish Academy of Sciences

Recruitment & Selection: Interview

Number of positions: Multiple (depending on specific interests of the candidates)

Research Area Description:

In the Internet of Things (IoT), substantial research has been devoted to architectural aspects of the infrastructure, i.e. edge, fog, cloud. The key assumptions were: (A) the closer to the edge (of the network), the less powerful devices become, with the cloud offering unlimited resources; and (B) communication get slower closer to the edge. Today the situation is more complex, and new approach is need for the edge-fog-cloud continuum.

Proposed research will focus on addressing real-world needs materializing in computing infrastructures, where: (1) ecosystems consists of heterogeneous nodes; (2) nodes can produce and consume (process) data; (3) nodes can initiate tasks (workflows); (4) nodes may "want to" collaborate with some nodes (to complete tasks), and "not want to" work with other nodes (depending on the task/context); (5) nodes can join/leave the ecosystem; (6) semantic technologies are used whenever beneficial; (7) nodes are connected by heterogeneous networks; (8) semantically demarcated services are orchestrated to realize workflows; (9) ecosystems may join (temporarily or semi-permanently) forming larger ecosystems; (10) ecosystem have self-* characteristics (follow concepts of autonomous computing); (11) frugal AI is needed to fit into resources of edge nodes; and (12) AI explainability/interpretability may be required.

Proposed research will draw from experiences gathered during last 20 years in the areas such as (this list is non-exhaustive): Grid Computing, Cloud Computing, Software Agents and Agent Systems, Semantic Technologies.

References:
1. EU context:
https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/opportunities/topic-details/ict-40-20201
https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/opportunities/topic-details/ict-56-20201
https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/opportunities/topic-details/horizon-cl4-2021-data-01-05

2. Pertinent work of the advisory team:
http://www.ibspan.waw.pl/~paprzyck/mp/cvr/research/IoT.html
https://www.ibspan.waw.pl/~paprzyck/mp/cvr/research/agent.html
https://www.ibspan.waw.pl/~paprzyck/mp/cvr/research/analytics.html
https://www.ibspan.waw.pl/~paprzyck/mp/cvr/research/semantics.html

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