RSS 2023 Workshop: Lowering barriers for robotics research

Poster application

1. Participant/author list with email addresses; indicate lead(s) / primary contact(s)

Emil Rofors, erofors@lbl.gov

2. Expected participation mode (in-person or remote)

In-person

3. Application type: Demonstration / poster / playtest (multiple allowed)

Poster

4. If demonstration

N/A

5. If poster application:
    - Extended abstract with captioned figures

See page 2 of this PDF

6. If playtest:
    - Description of background / personal statement / relevant experience

No playtesting other than if there's testing to be done on the Friday July 14th

7. Brief biography

Emil is a postdoctoral researcher with the Applied Nuclear Physics program at the Lawrence Berkeley National Laboratory since 2021. He's a drone-racing physicist who develops algorithms and methods to aid in both mobile and stationary radiation detection and imaging systems. The work lies at the intersection of nuclear safety, radiation detection, and robotics.

Poster abstract: Gamified robotics in outreach activities

Robots are useful tools in nuclear safety. Their jobs range from safety inspections, mapping radiation, in scenarios such as the nuclear disaster in Fukushima, to searching for lost or stolen radioactive sources. At the Berkeley Lab we have developed systems equipped with LIDAR, camera, and radiation detectors (neutron and gamma-ray sensitive) that can be used handheld, mounted on unmanned aerial vehicles, or lately also on ground robots such as the Boston Dynamics robot dog Spot. The robots operate by manual control, pre-programmed routes, or autonomously based on the radiation data they receive as they move. In developing new algorithms, a well-developed simulation tool for testing is essential. Such a simulation tool has been developed in the game engine Unity, which spawned the idea of a radiation search game that can use much of the actual code running on the real-life robots. In April this year a Berkeley middle school invited researchers to come talk to the students and explain their research. Figure 1 shows Emil Rofors explaining the use of robots before the group gets to control them themselves. A science-fair style monitor was used with a laptop screen mounted in the center, running the gamified simulation tool. A highscore list let the students compete for the most sources localized within 1 minute. The reception was overwhelmingly positive and successfully got many students interested in the field of robotics.

Figure 1. Middle schoolers learn about robots and operate a UAV searching for radioactive signals within the simulator game.