Postdoctoral Research Assistant
in AI for Autonomous Systems

Charlie Street

The advertised role overlaps heavily with my existing research on multi-robot coordination under temporal uncertainty. To capture temporal uncertainty, we require continuous-time planning models. I have used Markov automata to model asynchronous multi-robot execution, extended Markov automata for non-stationary environments, and represented robot policy execution with continuous-time Markov chains. With these models, I have applied sequential decision making techniques, such as labelled real-time dynamic programming, to synthesise robust and efficient robot behaviour under uncertainty. Further, I have extended sequential single-item auctioning for multi-robot task allocation under spatiotemporal uncertainty. Formal methods underpin my research. I have utilised model checking techniques for continuous-time Markov chains to reason over robot locations in continuous time, and the appearance of tasks in the environment. If accepted for the role, I hope to expand these ideas to synthesise guaranteed multi-robot behaviour.

I have a strong publication record in high impact venues such as IEEE T-RO and AAMAS. Further, I have presented my work at IEEE MRS and AAMAS, as well as through outreach events. For example, at the 2021 Goodwood Festival of Speed, I led demonstrations of a Toyota Human Support Robot, engaging with the public about robotics. Moreover, I have supervised four undergraduate dissertations and two internships, preparing me for the increased responsibilities as a PDRA. I have also led discussions on multi-robot warehouse logistics with industrial collaborators at Accenture Labs.

In addition to research, I have integrated my work onto robotic systems. In First Fleet, I integrated a planner developed during my DPhil onto agricultural robots supporting fruit pickers, which required modifications for online deployments. Moreover, my work with Team ORIon focused on deploying service robots in domestic environments. This requires fundamental robot behaviours such as manipulation, perception, navigation, and speech to build an integrated robotic system.

In summary, my research objectives align closely with the advertised role and the GOALS group in general, and if accepted I look forward to exploring this field further.