To whom it may concern,

With this letter I express my interest and willingness to perform all the required advising and mentorship duties related to the Undergraduate Thesis research of Mr. Praney Mathur, a student at BITS Pilani. This interest includes the option of remote supervision given the situations we encounter in response to the COVID-19 pandemic. In that context, I will be working with Pranay through:

- Weekly scheduled remote meetings to discuss his project and progress. In one of these meetings we will have the mechanism for Pranay to communicate with other researchers of my lab and exchange ideas in the form of paper/research presentations.
- Code sharing through the private code repositories of my lab so as to enable him to work on top of our prior efforts and in a manner synergistic to our overall research. This further allows direct code review and discussion on the specific technical level required.
- A well-defined set of milestones including the publication at a major conference in robotics (e.g., IEEE ICRA 2021).
- Two main presentation events from Pranay to me through which I can make a final assessment of the quality of the work.
- A comprehensive written report for the conducted research effort.

Mr. Mathur will be working on the problem of visual and visual-inertial localization for Micro Aerial Vehicles in the sub-500g class which in turn implies limited processing capabilities and lightweight sensing solutions. More specifically, Mr. Mathur will investigate the potential of visual-inertial odometry solutions based on:

- Sub-VGA resolutions with visible-light cameras on flying robots operating at speeds up to 2m/s. The achieved performance will be compared with the case of using higher resolution imagery as traditional in the literature of visual-inertial solutions.
- Depth images from Time-of-Flight sensors also integrated on a small sub-500g platform navigating at speeds up to 2m/s

This study will be completed with the explicit assessment of the robustness and survivability of these localization pipelines in the case of a collision-event given a mechanically resilient design of flying robots that can sustain physical interaction with the environment.

Best regards,
Kostas Alexis

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