

Draper / University Collaborative Research Proposal

Submitted by Draper Staff, in collaboration with University Faculty, to:

Draper Education Office / University Programs

Dr. Brenan McCarragher, CTO

617.692.0932

education@draper.com

About Draper Laboratory (www.draper.com)

Draper is an independent, not-for-profit corporation, chartered to work on problems in the national interest. Draper is **seeking collaborative research partners from universities** to further the state of the art in key technologies of mutual interest. Research Whitepapers describing Draper's technology interests and Technical Points of Contact can be found on the Draper Scholars webpage ([Draper Scholar Program | Draper](#)). The Draper Scholars Program funds thesis-bearing MS and PhD students at partner universities as one of the effective ways to progress the technology. Other means of collaborative research (e.g. joint proposals, sabbaticals, etc.) are also encouraged. Please contact education@draper.com if you have further questions.

(Draper) Researcher(s): Dr. Ima Smart (GAG3)

(University) Faculty PI(s) & University Affiliation: Prof Geenyus, University of the Northern Rainforest of Eastern Australia, Land-grant

(Draper) Research Title: Any Where, Any Time Communications for Hypersonics (AWATCH)

(Draper) Whitepaper / Technology Alignment: Sensing and Communications; Hypersonics

(Draper) Proposed Funding and Potential Source*:

Breakdown of funding source by project personnel. Materials support budget is limited, but approved as appropriate.

Scholar Type	Project Role / Justification	Funding Source (IRAD/Contract)
PhD	Student will develop a new set of Maxwell Equations and communications methodology to enable AWATCH in the intended environment. This work will be based on the research Prof. Geenyus has demonstrated on Mars over the last 5 years.	IRAD
MS	Student will package the technology and demonstrate its capability in a practical setting at the Draper golf outing.	Hypersonics Program (Contract)

Materials	Project Role / Justification	Cost
New set of golf clubs, tees, golf balls and greens fees	Masters student will use these to demonstrate the ability of the technology in a realistic environment.	\$3000

* A Draper Scholar is provided tuition and stipend per the Draper Scholar Agreement, typically 2-years for a MS and 5-years for a PhD. Additionally, conference travel funds (\$2k/MS; \$5k/PhD total), Draper IT resources, and access to Draper lab resources, are available.

(Joint) Research Scope and Plan (2 page max):

Professor Geenyus has been working on advanced communications systems that enable power-free, anywhere, any-time communications. This technology allows the user to communicate across great distances (millions of kilometers) with no need for the cumbersome restriction of energy. This technology has been demonstrated at Prof Geenyus' lab at Eberswalde. (Ref: Many papers at great conferences).

Prof Geenyus will take lead on developing the new physics, in conjunction with Draper staff.

This project will also progress Prof Geenyus' previous work by marrying it with Draper miniaturization and packaging technology to create a golf-ball sized final package. Draper will specify the application environment. And together the team will work on miniaturization, ruggedization and demonstration of the final package.

Once complete, Draper will then apply the technology to our accuracy programs and lunar space programs.

ROM Schedule:

Year 1 – 2: PhD student will develop new Maxwell Equations. Draper will define the operational conditions of interest. Prof Geenyus will expand the previous work into the new physics, as well as

Year 3-4: MS student will begin work of miniaturizing the technology and establishing the demonstration equipment and platform. Near end of Year 3, initially testing will begin with expected completion by mid-year 4 to for MS student to finish.

Year 5: PhD student will concentrate on finalizing the theory based on experimental demonstration. PhD student will concentrate on publications and finalizing their thesis.

Signatures

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