Experimentation with Biomedical Radar
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Biomedical radar is an emerging non-ionizing alternative to computed tomography (CT) scans and magnetic resonance imaging (MRI) for several clinical applications. However, traditional biomedical radars have significant design constraints that have kept radar from competing as a viable alternative technology. OU is in the process of building a new form of biomedical radar that will provide increased sensitivity, dynamic range, and resolution.

The FYRE student will work at the Advanced Radar Research Center (ARRC) in south campus and be part of the team (led by a former FYRE student) testing this new type of radar and comparing it to traditional biomedical radar designs. The radar will be tested on a range of materials, including 3D printed models, in the ARRC anechoic chambers. The student will gain hands-on experience with two forms of radar, as well as construction of biomedical phantoms. Depending on progress, the student may also work on the data processing required to characterize the radar performance. No prior knowledge is required, but students should be willing to learn to program (specifically in Matlab and Labview) as well as learn how to operate 3D printers. Training will be provided for operation of the 3D printers and the radar. Students interesting in radar, biomedical engineering, or electromagnetics are encouraged to apply.

Experimentation and AI/ML with a joint Automotive Radar/Optical System
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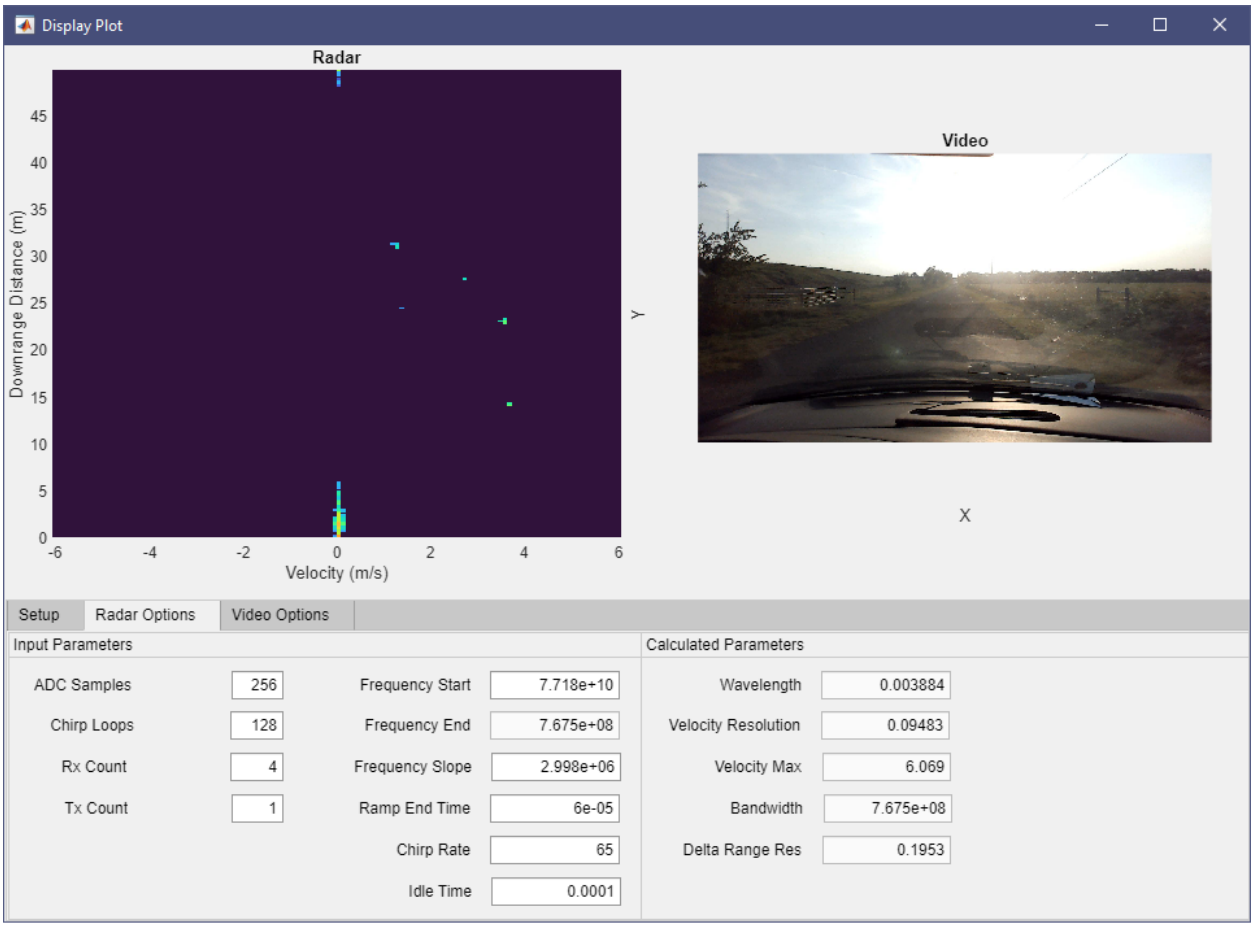
Autonomous driving systems rely on multiple sources of data, including radar and optical (i.e., cameras). We have built a joint automotive radar-optical experimentation system and are currently exploring artificial intelligence/machine learning (AI/ML) techniques for fusing the information from these systems together. Our goal is to improve the reliability of the data that would be fed into an autonomous driving system as well as investigate novel technologies for joint-system sensing (e.g., improved automatic detection of potholes, improving estimation of object location/velocity, etc.). To illustrate, below is a screenshot of the GUI that we have developed for viewing the joint-domain data.



The FYRE student will work at the Advanced Radar Research Center (ARRC) in south campus and be part of a team, including a former FYRE student, exploring these technologies. The student will first learn about open-source AI/ML tools and automotive radar technology, as well as assist with experimental campaigns. The student will then be encouraged to test out ideas from the literature or existing open-source tools, as well as to collaborate on new techniques developed by other teammates. Students should be willing to learn to program in Python and Matlab. Students interested in radar, AI/ML, and autonomous driving systems are encouraged to apply.