1 Job Title

DSP Software Engineer (Contractor)

2 Description

FreeDV is a suite of open source software for digital voice communication over HF radio. It consists of a voice codec (Codec 2), HF data modems, framing, and forward error correction software. Typical end users are Amateur radio operators, however the speech codec and waveforms have applications in many other areas.

The FreeDV organization is managed by a five member Project Leadership Team (PLT) and our Fiscal Sponsor is the Software Freedom Conservancy (SFC - a US based 501c3 non-profit, which serves their charitable mission by developing free software). We have recently been awarded a grant from the Amateur Radio Digital Communications (ARDC) to fund a two year development project.

We seek to create quality open source alternatives for core communications building blocks (vocoders and modems) for the benefit of society. Our strategy is to improve the speech quality of Codec 2, build new digital voice modes that equal or outperform SSB, and reference platforms for Amateurs to run these modes over the air. We will document the technology to a professional level and actively work with commercial HF radio vendors to integrate FreeDV into their radios. All software, hardware and documentation will be open source, breaking a quarter century innovation deadlock caused by incumbent closed source technology.

We're looking for two DSP Software Engineer (Contractors) to:

- Work with the FreeDV team to improve the speech quality of Codec 2 at a low (around 700) and moderate (1200-2400) bit/s rates. The goal is to equal or outperform incumbent commercial speech codecs.
- Optimize modem performance over HF multipath channels (real and simulated), measure performance compared to theory, and look for potential optimisations. The goal is to outperform SSB at low SNRs.

3 Position Responsibilities

1. Review of low bit rate speech codec algorithms.
2. Documentation of algorithms using Latex.
3. Assist in design and prototyping of new low bit rate speech coding modes.
4. Assist in design and prototyping of low SNR digital voice modem waveforms on HF (multipath) channels.
5. Porting of algorithms to C/C++ and verification against simulations.

6. Development of automated tests for speech coding and modem software.
7. Documentation of algorithms to a professional level.

4 Desirable Qualifications and Skills

1. Post graduate degree and/or 5 years experience in signal processing algorithm design and implementation.
2. Signal processing algorithm development and simulation in GNU Octave, Matlab or similar.
3. Experience with low bit rate speech codec simulation and implementation, including speech quality evaluation and algorithms for handling background noise.
4. Experience with OFDM modem development and implementation, especially for multipath channels.
5. Neural Speech codec implementation.
6. Competent with C/C++ in a Linux coding environment, CMake/Ctest, Git.
7. Comfortable with documentation in the English language and Latex.
8. Experience and ability to work remotely with an international team, and meet goals with a minimum of supervision.
9. Experience with HF Amateur Radio.

5 Employment Conditions

1. Contract, hourly rate position of 8-16 hours a week for 6-12 months (negotiable depending on applicant and skill set). Invoiced monthly, payment terms net 30 days
2. The first 8 weeks will consist of an evaluation period for both sides.
3. Working closely with the FreeDV team.
4. Weekly on-line meetings with the FreeDV Project Manager. Software and documentation committed to open source Git repositories and reviewed by the FreeDV team. Monthly 1 page written work reports submitted with invoices.

Application Process

Please send to freedv-project-leadership-team@googlegroups.com your application including:

- Cover letter describing your experience with respect to the desirable qualifications
- Resume
- A work portfolio - please show us some work you have done in the areas described in desirable qualifications above
- References