

# JOB: Mathematician/contractor

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- *From:* [audio.magician@xxxxxxxxxx](mailto:audio.magician@xxxxxxxxxx)
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## Job Description

Title: Mathematician (Consultant/Contractor)

GFT Group seeks a highly creative individual with solid skills and experience in advanced mathematics for a speech recognition project. The project will develop new concepts and advanced mathematics that substantially improve the accuracy of current speech recognition technology. This is a challenging project that requires unusual skills. It involves a close integration of advanced theory and practice not found in most commercial algorithm projects and academic research projects. The project offers the opportunity to perform fundamental scientific research with substantial immediate practical benefits and applications.

GFT Group is developing a new speech recognition engine with superior accuracy compared to current speech recognition engines such as Dragon Naturally Speaking, ViaVoice, Microsoft Speech, and the open-source SPHINX speech recognition engine. The engine should enable or enhance rapid jumping to targets such as files, web sites, PowerPoint slides, submenu selections and so forth on computers by simple voice command, dictation of documents, and hands-free operation of computers, cell-phones, automobile accessories and many other devices. Our target is to achieve 100% accurate speaker-independent phoneme recognition in the presence of typical background sounds such as car noises that do not impair human speech recognition. We do not expect to solve the homonym resolution problem for general unstructured human speech. The effective speech recognition accuracy, the word error rate, of the engine will be determined by the frequency of homonyms and near-homonyms, words and phrases that sometimes sound the same, in the recognized speech.

The Mathematician will help translate advanced concepts in human speech to specific mathematical formulas that can be tested on human speech data and, if successful, converted quickly to software for a real-time commercial speech recognition engine written in a portable compiled language such as ANSI C. The engine will include a Microsoft Speech

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compatible wrapper.

The task is similar to the inference of mathematical formulas such as differential equations from experimental data and from concepts expressed in words, pictures, and rough mathematical formulas. It may resemble, for example, the translation of Michael Faraday's ideas about electricity and magnetism from the words and pictures that Faraday used to a set of new differential equations by James Clerk Maxwell. Experience with this process is most valuable for this position but is not a requirement.

A strong knowledge of the physical processes and/or visual representations corresponding to individual terms and factors within terms in differential equations and other mathematical formulas should be helpful. A strong knowledge of English verbal descriptions, words, and phrases used for these physical processes and/or visual representations should also be helpful. This should make it easier to identify the mathematics — for example construct a new differential equation — corresponding to features of data and advanced concepts expressed in words and pictures.

Experience in the following areas may be helpful, but is in no way a specific requirement of the position:

1. Non-linear differential equations
2. Classical invariant theory
3. Differential geometry and tensor analysis
4. Hidden Markov Model speech recognition methods
5. Adaptive signal processing
6. Music theory and practice
7. Acoustics of Speech Communication
8. Implementation of advanced mathematical algorithms in C or similar languages
9. Mechanical modelling, finite element analysis, and simulation of elastic materials.

The Mathematician must be able to think creatively, "outside the box", and have a solid foundation in advanced mathematics including the ability to learn new areas rapidly as needed. An advanced degree in mathematics, applied mathematics, or theoretical physics may be helpful, but is not required. This is primarily a pencil and paper task; computer skills (for example, knowledge of a computer algebra system such as Mathematica) may be helpful but are not required.

The Mathematician will be an independent contractor and will need to sign a non-disclosure agreement to perform the task. The Mathematician will need to work closely with a scientist from GFT Group in a collegial style. This is not implementing someone else's ideas but requires shared creativity by skilled experts in complementary fields. The opportunity to share license fees from the technology and inventor

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status (on patent applications for example) may exist.

GFT Group is a private research and development and contracting organization with several products in the speech recognition field. For more information, see <http://www.Petrana.net>

Please submit a cover letter and a résumé and/or curriculum vitae in the body of a single plain text e-mail message. A statement of research interests and research philosophy may be helpful, but is not required. Please send plain text only. No attachments, hypertext, or active content. Please include the word "Mathematician" in e-mail subject line. Please send to:

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