

Ultra-Rapid Scan Disk-mirror FT-IR Spectrometer

Manning Applied Technology - Troy, ID



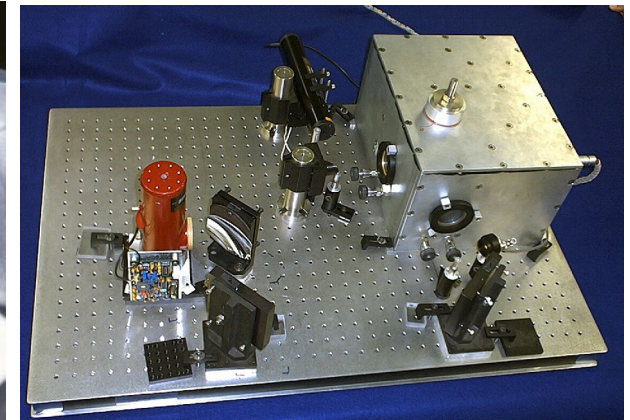
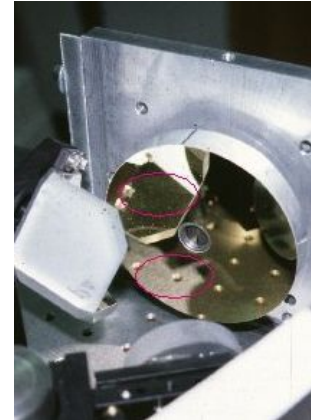
Identification and Significance of Innovation:

The innovations are:

- Novel interferometer geometry.
- Novel drive mechanism – brushless DC motor.
- Powerful, compact and inexpensive DSP hardware and software.
- High spectral resolution (2 cm^{-1} or better).

The significance is:

- 1000 spectra per second - 100 times faster than conventional technology.
- Tilt-compensated.
- Very rugged and immune to disturbances.
- Improved noise rejection.
- Network interfaces allow remote monitoring.
- Real-time process monitoring for industrial applications.



Technical Objectives

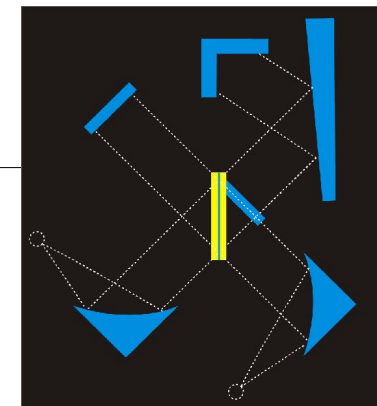
- Design prototype, model opto-mechanical components, select materials for manufacturing, and test reliability.
- Design DSP and electronic architecture
 - Hardware identification, data processing algorithms, auxiliary hardware.
- Design software interface
 - Software tool identification, DSP communication algorithms, graphical interfaces, spectrometer command language.
- Model and verify algorithms, system model, photometric accuracy, and stability.

Work Plan:

- Using 3-D CAD package, design prototype
- Implement off-the-shelf electronics for DSP architecture
- Select programming software package and program DSP chipsets
- Use MATLAB® to theoretically model system
- Test photometric accuracy using photometric standards
- Test stability over time and temperature

DoD Applications:

Aerospace remote sensing.
Combustion research.
Missile spectral signatures.



Dual-use Applications:

Real-time process industrial process monitoring.
Combustion research.
Polymer, pharmaceutical, chemistry research applications.
Conservative estimates of 5% market share over \$3,500,000 per year.
Cost-effectiveness insures capture of a significant market share.

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