

Compact, Rugged and Stable Modular FT-IR Spectrometer System

Manning Applied Technology - Troy, ID



Identification and Significance of Innovation:

The innovations are:

- Compact, inexpensive, rugged, and stable interferometer modules.
- Novel rotating prism interferometer combines high throughput and very-rapid-scan operation.
- Enhanced performance with powerful, compact and inexpensive DSP hardware and software for control and data acquisition/processing.
- Modular design allows flexible source and detection interfaces.

The significance is:

- Large volume pricing estimated to be less than \$4000 per unit.
- Particularly suitable for standoff, point detection and remote sensing.
- Network interfaces allow instruments remote monitoring.
- Real-time process monitoring for industrial applications.



Technical Objectives

- Design prototype, model opto-mechanical components, select material for manufacturing, and test reliability test
- 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 and select materials
- Implement off-the-shelf electronics for DSP architecture
- Select programming software package and program DSP chipsets
- Use MATLAB® to theoretically model spectrometer's operation
- Test photometric accuracy using photometric standards
- Test thermal stability in temperature control chamber

DoD Applications:

Chemical agent detection
Pollution monitoring
Biological contamination inspection
Hazardous material analysis

Dual-use Applications:

Non-invasive monitoring of blood glucose and other metabolite levels
Real-time industrial process monitoring
Polymer, pharmaceutical, chemistry research laboratory applications
Conservative estimate of 10% market share gives sales of \$6,000,000 per year
Cost-effectiveness insures capture of a significant market share.

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