- **Progect Title:** Open Loop Fiber Optic Gyroscope
- **Executive Organizations:** Iran Electronics Industries (IEI) Co, Isfahan Optics Industries (IOI)

• Abstract:

This system is an interferometric fiber-optic sensor for measurement of angular velocity of an object. It is used extensively for stabilization and short term navigation in applications such as imaging and tracking platforms, robotics and guided projectiles.

Its principle of operation is based on the phase difference of optical beams which is produced by the optical path difference in the length of the light propagation i.e. the fiber-optic coil (Sagnac interferometery). After passing through an optical coupler, the generated light of the optical source is fed into the optical polarizer. At this point, after applying a specific polarization, the light is transferred to the second coupler which sends it to the fiber-optic coil. After passing through the coil in clockwise (CW) and counter clockwise (CCW) directions, the exit beams of light return to the entrance path and enter the photodetector by passing through the first coupler.

As a consequence of the rotation around the perpendicular axis of the coil, a phase difference is produced between the CW and CCW propagating beams. This phase difference is converted to the intensity variations by means of the detection circuitry.

In order to extend the ability of the sensor for sensing the direction of the rotation, a modulator is used in the path toward the coil. In this design, a piezoelectric cell is used as a modulator. Stimulated by a sinusoidal signal, the cell inserts the optical path difference between the CW and CCW paths. In this way, the resulted signal in the detector is a Bessel signal which is expandable to different harmonics of the modulator frequency. By multiplying this signal by the applied signal to the modulator, the first harmonic is extracted and the angular speed information is obtained.