

## ***Reflective Optical Programmable Encoder in Thumb Size***

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**Abstract** A concept presented for integration of Reflective lens less optical phased array photo sensor with use of blue led in a thumb size is a flood gate open for automation industries .this combinations makes difference over Magnetic and transmissive optical technology. it has a high space utilizations with greater gap between sensor and disc is unique feature over transmissive technology . Slick components used featuring of short wavelength as well as low jitter in output signal due to improved signal quality. Use of this technology gives low optical crosstalk .Interpolation programming of sin-cos signal for easy higher resolution are getting at low cost compared to optical encoder. Mechanical thumb structure gives space benefit in a various applications.

**Keywords**— optical encoder, photo sensor, thumb size, signal,

### ***Introduction***

In human life Automation is the success key for development in every place in day to day. This need convert into save time, money, wealth of society and increasing better utilizations of resources and time. For that study the motion control is very important in respect of automations .motion may be linear, rotary, angular, curved, or any form .You say

that it is a little bit point of contact always, in the live conditions and gives the feedback for control system without need of human input for corrections .to make control of mechanical motion interfacing to electronic card transducers are born.

In early stage to control the rotary motions tacho generator, potentiometer, resolver,magneticencoder, Optical encoder are used but now a day as the market becomes increasing driven by consumer demands, businesses are forced into an intensified effort of meeting those demands to ensure business survival. It is a free for all in a business landscape that is filled with unpredictable sentiment and unforgiving circumstances. From suppliers to manufacturers, distributors to sales channels, all mechanisms involved in supporting the end products are faced with the seemingly unreasonable task of delivering products that are record-breaking miniature sizes; complete with extended capacities, high quality, while continuously maintaining a cost-down price structure. Validate for end use as desired/estimated in thought. An optical encoder has become recognized as an indispensable displacements /position sensor over magnetic sensor to its advantages of excellent immunity to electromagnetic interface, high resolution, light weight and less space .It plays a vital role in allot of industrial applications enabling precise positions control encompassing robotic controls printers, diamond cutting ,cut to length .the encoder which

typically involves a code disc optical sensing head and signal circuits is classified into two categories of reflective or transmission depends on arrangements of light source ,code disc and photo detector. All transmission type encoder are usually pursued to conveniently dispose its constitute elements and having the space constraints

## EASE OF USE

### *Principal*

The operating principle of reflective is light emitted by the transmitter is influenced by an object or a media on its way to the detector the change in the light signal caused by an interaction with the object then produces change in the electrical signal in the opto-electronic receiver

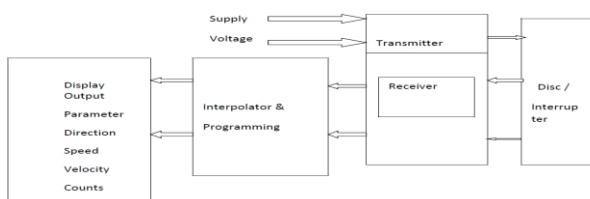


Fig: 01: Block diagram of Reflective programmable encoder

## Blue LED

Blue LEDs are the basis for white emitters which are in extreme demand by the automotive and illumination markets. Today long term temperature stable blue LEDs are available which outshine the IR and red LEDs used in encoders so far, because they offer

Higher light yield and efficiency at even lower cost. Optical position sensors benefit notably as a result of the technological progress of both LED and CMOS technology. IC-Haus has optimized the new incremental scanners in its high resolution iCPTH- Series especially for blue light. The integration platform for such single chip encoder is denoted by the trademark Encoder blue [3]

## Hardware design and set up

To integrate a sensor and disc with a minimum size and adding various features to encoder like reverse polarity protection, Short circuit protection with bearing encoder



Fig 02: Reflective proto testing set up

Provides great deal in size utilizations of all side, crippeage distance during the pcb design and placing components for Considering Reflow soldering for all packages

Placing the electronic components like sensor ic having size of 5 mm by 5mm and interpolator .As this is the Optical encoder hence gap between sensor and disc should maintain within 100 micro mm to 1.5 mm for good results

Signal integrity plays important role because for a long cable distance signal transmission .Voltage drop and parasites capacitor

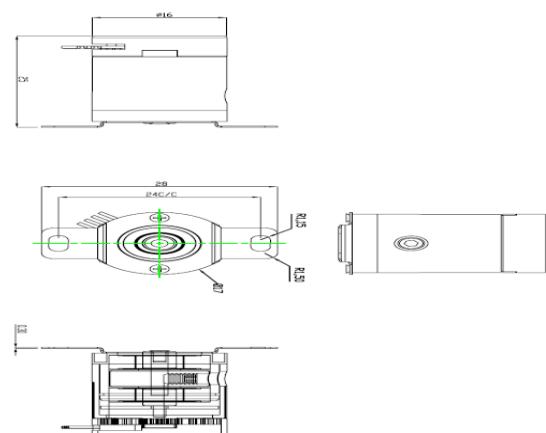
## Mechanical Design

As defined encoder is an electro mechanical device that transmit mechanical motion in to an electrical signal by using Reflective principal. All electrical signal quality of sine cos pulse and driver output is depend upon the gap bet the sensor and disc and horizontal and vertical ovality of disc with respect to centre, Boring of shaft and taper of shaft plays role during the manufacturing of shaft . Process is critical

Shaft material and his hardness and surface finish plays important role for higher accuracy and better resolutions control over these parameters plays long life encoder performance for getting accurate results

Fig03: thumb size layout

Hub design makes sense because PCB is resting over the hub machining of hub for ovality puts the signal output variations and bearing size concentric boring also make sense to quality of encoder signal placing the PCB and crimping for



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permanent holding the pcb .

As this is the reflective technology materials of disc and its coatings plays important role in relative collector currents as the sensor position is perpendicular to the surface of deposition

Fig04: Proto built of Thumb size

Flatness is achieved using materials like polycarbonate, glass, metal with sputtering of target materials chromium.

Table: 01: Encoder output Speed-frequency

Speed	Output frequency
200rpm	53.33khz
500rpm	133.33khz
1000rpm	266.66khz
2000rpm	533.33khz



Fig05: Output signal of reflective encoder

## Conclusion

From the given Proto type design and reading it shows that o/p of encoder are easily interpolated and getting higher PPR and resolution compared to normal optical encoder As seen from above proto design that all encoder feature are obtained in thumb size Great space utilizations and programmable output is achieved by interpolations

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