



e-ISSN: 2319-8753 | p-ISSN: 2320-6710

IJIRSET

International Journal of Innovative Research in
SCIENCE | ENGINEERING | TECHNOLOGY



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

Volume 10, Issue 6, June 2021

ISSN INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA

Impact Factor: 7.512



9940 572 462



6381 907 438



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Effective Sensor in Internal Inspection Pipe Robot

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ABSTRACT: This report gives the initiation about various sensors is used in internal pipe inspection robots. The sensor is a device that finds out the modification in physical and electrical or different quantity and thereby build output and whose motive to detect the event. It collects information about the environment and the data collected with the help of this multiple sensor. The sensor is nothing but a transducer, and we generally use the sensor and it detects the event or change, in its environment and send the information to the electronic device. The speedy location of these abstractions in a small size enlightening way is the objective follow in this work.

KEYWORDS: Infrared sensor; Position measurement; acoustic applications ;

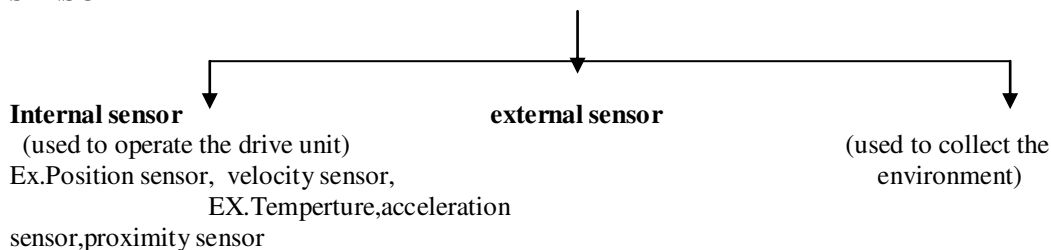
I. INTRODUCTION

The introduction Let us see like how to design and develop the senses, how to use the sensors. What are the different types of sensors used in pipe inspection robot? And how can I collect information with the help of sensors? Now, we human being, we use different type of sensors. Like, we have got the Eyes Ears, Nose skin. In fact, we use multiple sensors. Collect information of the environment and the data collected with the help of this multiple sensor. Actually, there will be some processing in our brain and with the help of this particular processing, we can collect information of this particular, the environment. Similarly, if you want to make robot intelligent, we should put a few senses and these sensors will help the robot to collect information. Now, here, let me Define the sensor is nothing but a transducer, and we generally use sensor. To take some measurement of physical parameter or physical variable and here, this sensor if you want to use as a measuring device. So definitely, there must be some calibration. And by calibration actually mean, it is actually the comparison with some known data. Now, through comparison with the known data like will be able to calibrate a particular, the measuring device or a particular, the sensor.

ROBOT SENSOR

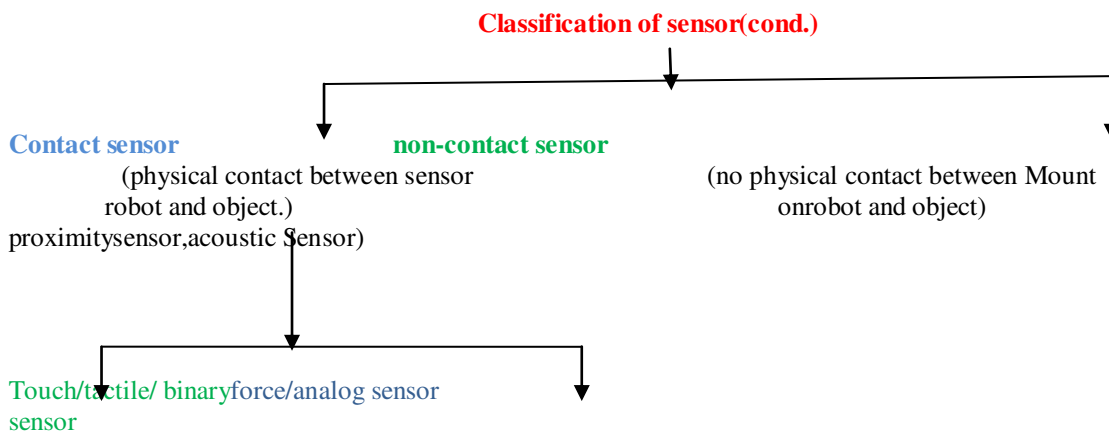
- Robotic sensor are used to estimate a robot condition and environment .tese signal are passed to a controller to enable appropriate behavior.
- Robot sensor perform several function like identificationof object,guiding the robot without obstruction,identification of path,objectavoidanceand so on.

SENSOR



Now, you might be knowing that we use different types of sensors. We use different to take some measurement. For example, to measure the joint talks, we use some sensor to measure force. We can use some sensor, but we have to calibrate. Now, this calibration is a Mass for any such sanction. Now, here actually, if you want to make it intelligent, as I have already discussed that senses are to be used, or cameras, are to be used to collect information of the environment, and then only we can do some processing to take some decision in a very intelligent way. So, this particular, the calibration is a must for any search sensor. Now, if you see that literature, we have got different types of sensors. For example, say if you classify the sensors, in this way, we can classify like internal sensor and external sensor.

Now, this internal sensor are nothing but the sensor which are used to operate, the drive units. For example, you have got some positions answer, Has then we have got the velocity sensor, acceleration, sensors, then pores of the moment senses. These are all internal sensors and on the other hand, we have got a few other senses which are used to collect information of the environment and those are known as the external sensor. For example, we can use some setup, proximity sensor, acoustic sensor, then comes your usual sensor temperature, sensor, these are all external sensor.



Now, the working principle of the And internal and external sensor used in internal pipe inspection robots. Now if you see the the literature the senses are also classified in different ways. For example, say for example the sensors could be named as contacts sensor or the non contact sensors. So by conditions, as we mean there is a physical contact between the sensor and this particular object whose distance are going to measure. And if there is no such contact or physical, contact between the sensor and object that is called The non-contact sensor. Now, this contact sensor can be further classified into two, subgroups But one is called the touch sensor or tactile sensor or the binary sensor. So you have got the touch sensor or tactile sensor or this binary sensor. It is almost similar to our skin. Skin is nothing, but our touch sensor. So in robots also use some touch sensor or the binary sensor.

CONTACT SENSOR :-

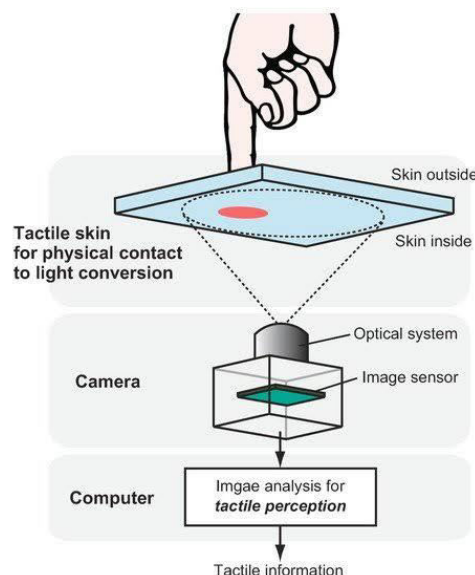
Contact Sensors are those which require physical contact, against other objects to trigger. A push button switch, limit switch or tactile bumper switch are all examples of contact sensors. These sensors are mostly used for obstacle elimination robots. When these switches hit an hindrance, it triggers the robot to do a task, which can be reversed, turning, switching on an LED, Stopping etc. There are also touch-sensitive contact sensors which react only to the human touch (Not sure if they react to animals touch). Touch screen Smart phones available these days use resistant touch sensors (Not to be confused with older stylus based models). Contact Sensors can be easily performed, but the drawback is that they require physical contact.

TACTILE SENSOR :-

A sensing device that specifies the contact between an object, and sensor is considered as the Tactile Sensor. Tactile sensors are often in everyday objects such as elevator buttons and lamps which dim or brighten by touching the base. There are also innumerable applications for tactile sensors of which most people are never aware.

TOUCH SENSOR :-

For example, say the micro switch or the limit switch, which is generally used in robots are nothing but the examples of your tactile sensor or touch sensor now with the help of this sensor, So it is simply going to tell that the robotic finger has touch a particular object but Like the object but it is not going to measure the force required to get that particular object, or how much is the force required to or how much either the torque required to manipulate that particular object? So it only indicates whether the content has been made or not. Now let me take a very simple example. Now, in all the water tanks or the oil tanks, we use a valve that is called the float valve. Now, this particular float valve. The function of the float valve? If this is the tank, the moment, it reaches the water height, the reaches, a particular level, the pics level. So this particular Ocular floodwall will be activated and it is going to indicate that you stop the pump and the pump will be stopped and the water supply to this particular water pump will be stopped. So this indicates the highest limit the highest permissible limit for this particular, the water and that is nothing. But this float bar is an example of your, the limit switch, or either the touch sensor or the tactile sensor. Now, this is also known as the binary sensor. For example, say the micro switch or the limit switch, which is generally used in robotic hand, and just going to take one example , I'll show you that we can use some setup.

**Fig 1:tuctile sensor****APPLICATION :-**

- [1] A tactile sensor is a device that measures information arising from physical interaction with its.
- [2] Deformation of bodies (strain) or fields (electric or magnetic) .
- [3] Manipulation, Grasp force control , contact locations and kinematics , stability assessment . PR2 Exploration Surface texture , friction and hardness , thermal properties .
- [4] Response : Detection and reaction to contacts from external agents .

BINARY SENSOR :-**Working Principle :-**

Binary sensors work based on the concept that the spread of touch and no-touch values across the sensor array would provide a measure of the geographical distribution of force. These sensors are contact switches that are placed on the inner side of each finger on a robotic hand.

Micro switch or the limit switch along with the on the robotic hand. Now, this is also called the binary sensor because it generates ones and zeros the moment it touches. So it will generate your, it will generate this particular one and

otherwise it will generate this zero. So it is going to generate one or zeros. Okay. So this is known as binary because sometimes it generates one sometimes it generates zero, if there is a contact it will generate one. If there is no content, it will generate 0. So, it is some setup one zero zero one something like this. And that is why this is also known as your the binary sensor.

MICRO SWITCH SENSOR:-

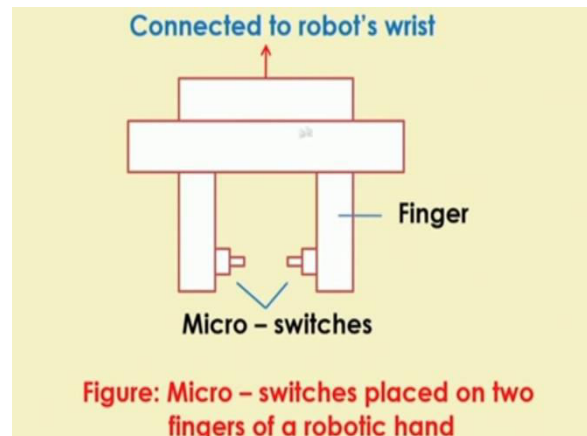


FIG 2:-MICRO SWITCH

Now here, I'm just going to take one typical example of a micro switch which is nothing but a touch sensor used in robot Gripper. supposing that this is a very simple the gripper having two fingers And here we are just going to put some micro switch or the limit switch. Now with the help of this micro Switch, which actually it is going to indicate. Whether the contact has been made between the objects opposing that are got the object here, whether the contact has been made between the object and these particular, the robotic finger. So, to solve the type of purpose, we use your, the micro switch or the limit switch and that is nothing, but the touch sensor. The same is true. We have got the skin. So with the help of this particular skin, we can touch. We can feel the presence of an object even if we are not using eyes we can fill the shape and size or the the modernist, the structure of that particular object. Even if we do not see with the help of eyes because we can use our skill and skin is nothing but the touch sensor and with the help of this touch sensor, in fact we can find out what should be the possible shape and size of this particular the object.

Optical Encoders :-

An optical encoder is an electromechanical device which has an electrical output in digital form corresponding to the angular position of the input shaft. It is used to measure rotational movement exactly. Intelligence obtained from an optical encoding encompass direction, distance, velocity and location.

- A) Absolute Optical encoder
- B) Incremental Optical encoder

A) Absolute Optical encoder:-

- It is mounted on the shaft a rotary device .
- To generate digital word identifying actual position of the shaft measured from zero position Optical encoder.

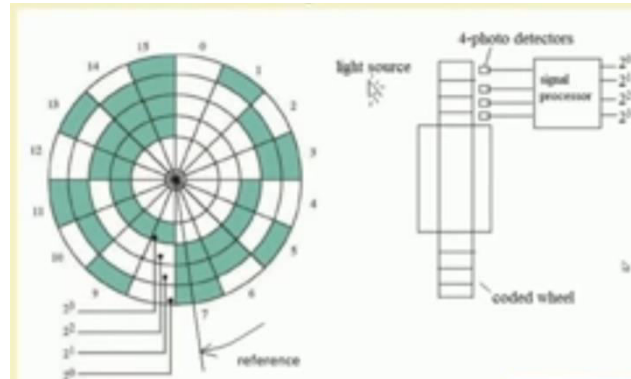


FIG 3 :- OPTICAL ENCODER

Now let me first try to explain the principle of this absolute Optical encoder. Now, this absolute Optical encoder consists of a number of concentric Rings placed one after another. Now supposing that say this is the output shaft of this particular motor. I've got the electric motor here. So this output shaft is rotated. absolute Optical encoder is nothing but a collection of a few concentric Rings least one after another and what you do is so here we have got the concentric rings and on these particular concentric Rings. There will be the markings on. That means there will be dark Zone and the light Journey that means through the dark Zone, the light will not pass and forth through this particular light, Jordan. Light will pass now on. So here we have got the optical encoder. So as the shaft rotates, the optical encoder mounted on, it is also rotating. Now, on one side I have got the photo Source other side. We have got the photo detector, the moment during the rotation. So this particular the disc the circular disc or the rotating days. The Light June comes in front of the light source, the light will pass and it is going to activate that particular the photo detector.

B) Incremental Optical encoder :-

Consists of one coded disc and two photo - detectors By counting the number of light and dark zones , angular displacement can be measured with respect to known starting position .

- It can determine the direction of rotation also
- It is construction - wise simpler , less accurate and less expensive.

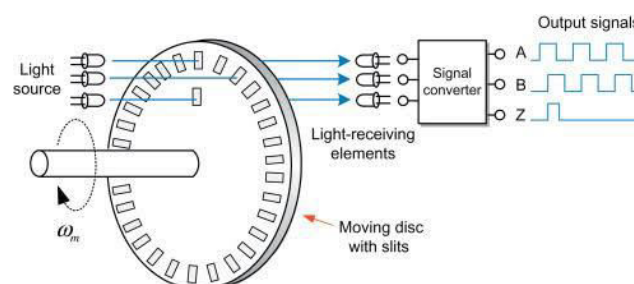


FIG 4 :- Incremental Optical encoder

- The disk has a single circular track with identical and similarly spaced translucent windows.
- The area of the opaque region between adjacent windows is equal to the window area.
- Two photodetector sensors (pick offs 1 and 2) are fitted confronting the track a neighbourhood– pitch.

The problem is usually the number of photo, detectors should be equal to the number of concentric rings. So if I use 10 concentric rings .The incremental Optical encoder we use only two photo detectors and there is only one coded disk. So we do not use a large number of correct disc here and we do not use a large number of photo detectors .

Analog/force sensor :--

Analog sensors are the devices that produce analog manufacture in correspondence to the quantity being calculated. Such an sensors also check the change in external factors such as light intensiveness, speed of the wind, and solar radiation, and excess.

Now going to concentrate on the force sensor or this analog sensor. Now, as I told that with the help of this Force sensor on this analog sensor, we are just going to actually measure the force or the torque. So this particular force and torque which is required to grip this particular, the object and generally we use some sort of the force sensor on the analog sensor and hearing for sensor or unlock sensor, we use some sort of strain gauges. So I'm just going to discuss The working principle of this particular strain gauge in details and as I told that we have got a few non contact sensors. For example, say we have got the proximity sensor, the rain sensor, the visual sensory acoustic sensor, so these are all non contact sensor so I'm just going to discuss in details.

Same is true or your the sensor.so these are the information which are to be provided to prepare the specification of this particular, the sensor.

APPLICATION :--

1. In all our robotics kits the sensors are digital or analog . .
2. For instance , in HandyBoard , analog sensors can be plugged into the analog sensor ports , which return values between 0 and 255 .
3. Digital sensors can be plugged into either the digital ports or the analog ports , but will always return either 0 or 1 .

ANALOG 0 = < x = < 255
DIGITAL 0 or 1

II. CONCLUSION

It is concluded that robotic sensor is the most significant device for the robot to accomplish various tasks Sensor make the working on a robot very efficacious, which is able to obtain information from the interaction between robotic hand and their environment .We can choose the sensor according the requirement and working surroundings of robot .

REFERENCES

- 1.Hirao, M.; Ogi, H. *EMATs for Science and Industry: Noncontacting Ultrasonic Measurements*; Springer Science & Business Media: Heidelberg, Germany, 2013.
- 2.Niu, X.; Duan, W.; Chen, H.-P.; Marques, H.R. Excitation and propagation of torsional T(0,1) mode for guided wave testing of pipeline integrity. *Measurement* 2019, *131*, 341–348
- 3.Bauer, T.; Laing, D.; Tamme, R. Overview of PCMs for concentrated solar power in the temperature range 200 to 350 °C. *Adv. Sci. Technol.* 2010, *74*, 272–277.
- 4.Laing, D.; Bahl, C.; Bauer, T.; Fiss, M.; Breidenbach, N.; Hempel, M. High- Temperature Solid-Media Thermal Energy Storage for Solar Thermal Power Plants. *Proc. IEEE* 2012, *100*, 516–524.
- 5.Ditri, J.J.; Rose, J.L. Excitation of guided elastic wave modes in hollow cylinders by applied surface tractions. *J. Appl. Phys.* 1992, *72*, 2589–2597.
- 7.Ma, J.; Lowe, M.J.S.; Simonetti, F. Feasibility study of blockage detection inside pipes using guided ultrasonic waves. *Meas. Sci. Technol.* 2007, *18*, 2629–2641.
- 8.Akyildiz, I. ; Su, W. ; Sankarasubramaniam, Y. ; Cayirci, E. A survey on sensor networks. *IEEE Commun. Mag.* 2002, *40*, 102-114.



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