



# INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

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## Novel Wireless Water Level Recording System

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### Abstract :

*In this paper we present water level indicator with wireless remote connectivity . During the rainy season it is necessary to check the water level every time at the dam site to avoid any calamities. We designed a model which can measure the water level and transmit it. Using float and pulley arrangement and rotary encoder we measured the water level and using MICRF module we have transmitted the recorded data. Rotary encoder is attached to the shaft with the help of hub. The Change in water level will rotate the pulley and incremental encoder. A typical encoder uses optical sensors to provide a series of pulses that can be translated into motion, position, or direction.*

### 1. Introduction:

Measurement of the water level in the reservoirs of the dam is the most critical method for the safety of dams and the people at the rivers site. During the flood, by automatically and effectively knowing the level of water in the dams, we can control the level in the dams.

In India such automatic systems are needed to be designed for the various irrigation as well as hydroelectric station. In advance countries such systems do exist. So our aim is to design device which can measure the water level, store and transmit the data wherever required.

Today basic principle of measuring devices have a wide range of application in the industries such as water leveling temperature control process control and level control

Since most process equipment operator at a constant load, the best solution to control the problem is to set all variable, that affects the process to proper position and forget about the process.

Mechatronics is a term coined by the Japanese to describe the integration of mechanical, electronic engineering and computer science. This technology has produced many new product and provided powerful ways of improving the efficiency of products we use in our daily life. Mechatronics solves technological problem using interdisciplinary knowledge consisting of mechanical engineering, electronics and computer technology.

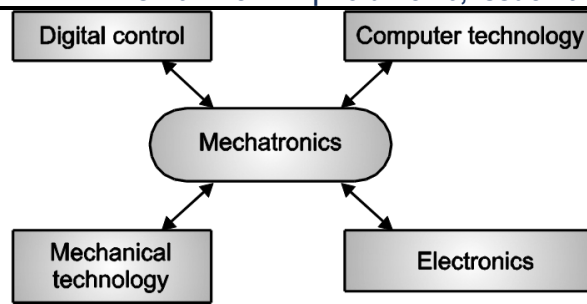


Fig. 1. General Mechatronics System

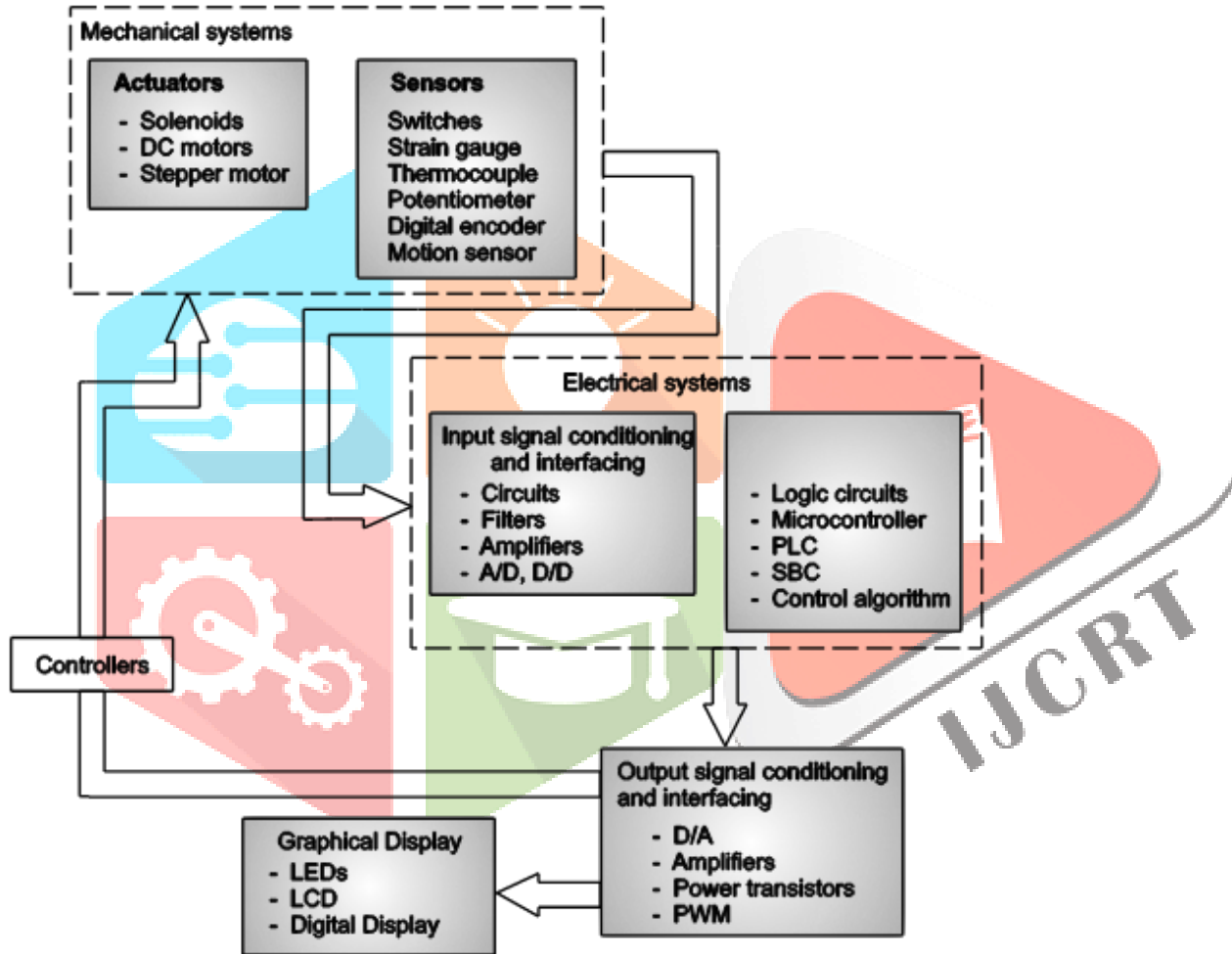


Fig. 2. Key Elements of Mechatronics System

## 2. Proposed System :

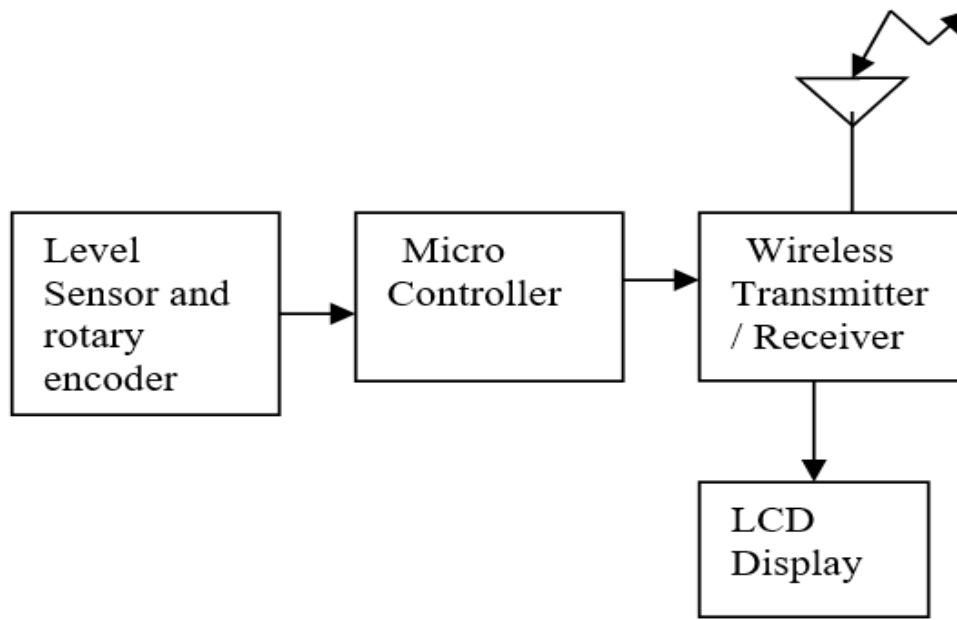


Fig. 3. Typical Measurement System

## 3. Explanation :

### 1) Level Sensor:-

#### a) *Float and pulley arrangement:*

In this part we are measuring the water level using float, pulley and counter weight arrangement. The increase and decrease in water level will move the float and counter weight attached to two ends of rope up or down. The material for float depends on the liquid on which it floats. For water the float can be made of wooden, steel, fiber etc. We have used steel for float. The weight of float must be greater than that of counter weight.

#### b) *Rotary Encoder :-*

Rotary encoder is attached to the shaft with the help of hub. The Change in water level will rotate the pulley and incremental encoder. An encoder is an electrical mechanical device that can monitor motion or position.

A typical encoder uses optical sensors to provide a series of pulses that can be translated into motion, position, or direction.

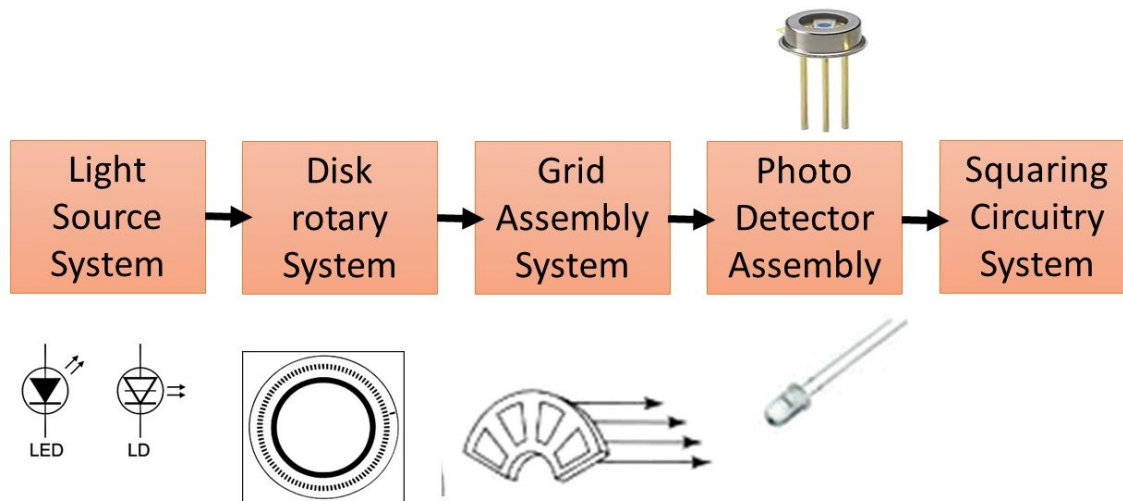


Fig. 4. Figure shows a diagram of rotary encoders and photo sensors.

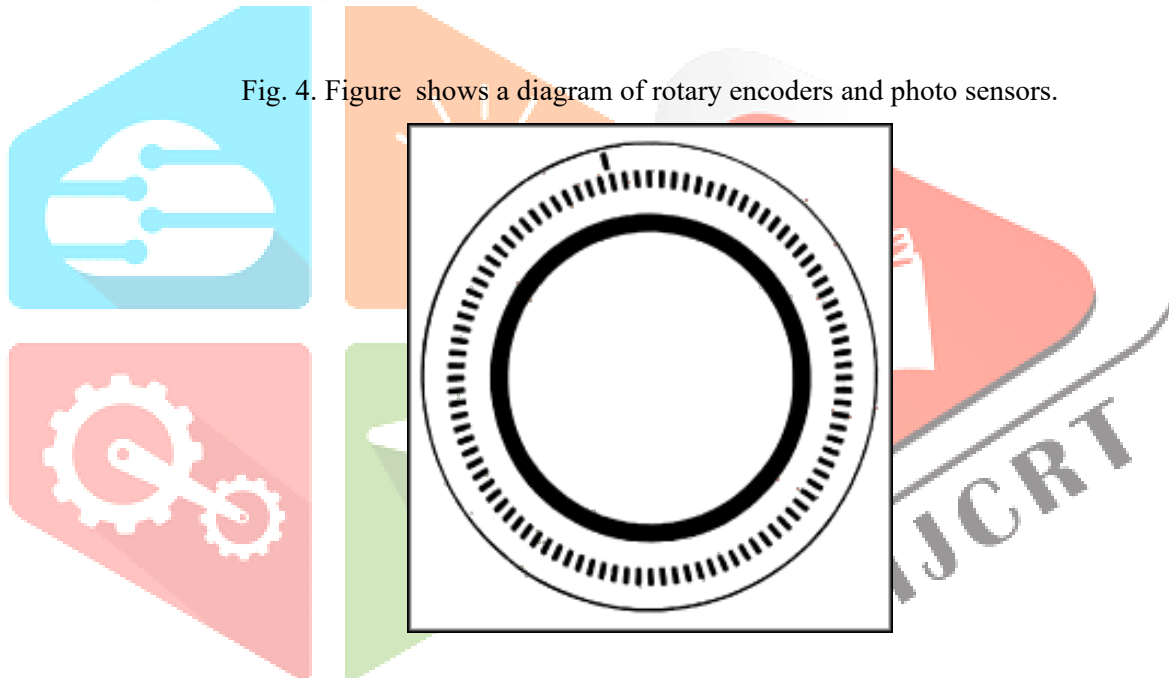


Fig. 5. Details of the rotary encoder with slots

The diagram in Fig. shows that the disk is very thin, and a stationary light-emitting diode (LED) is mounted so that its light will continually be focused through the glass disk. A light-activated transistor is mounted on the other side of the disk so that it can detect the light from the LED. The disk is mounted to the shaft of a motor or other device whose position is being sensed, so that when the shaft turns, the disk turns. When the disk lines up so the light from the LED is focused on the phototransistor, the phototransistor will go into saturation and an electrical square wave pulse will be produced.

We have mounted two optical sensors on encoder so that square pulses obtained from these two sensors are  $90^\circ$  out of phase. We have made a rotary encoder with diameter same as pulley and having slots of 2 cm each. As a result of this resolution for the water level will be 1 cm. Resolution of water level depends of slot width.

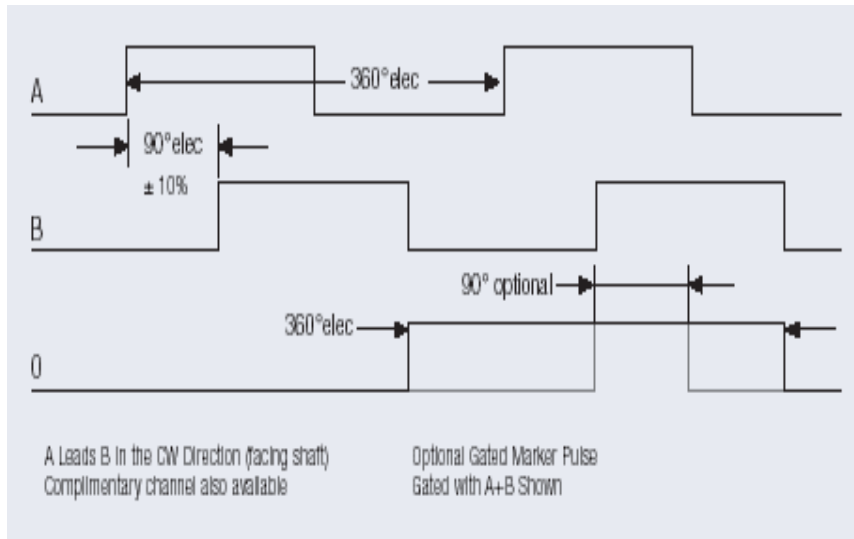


Fig.6. The relative position of pulses

The relative position of pulses gives the direction and number of pulses will give count.

## 2) Microcontroller 89C51 :-

A microcontroller is a compact IC (integrated circuit) device constructed to control a particular process in an embedded system. A typical microcontroller IC system comprises of a processor, memory and input/output (I/O) peripherals on a single chip (IC System). General Classification of different microcontrollers are as follows.

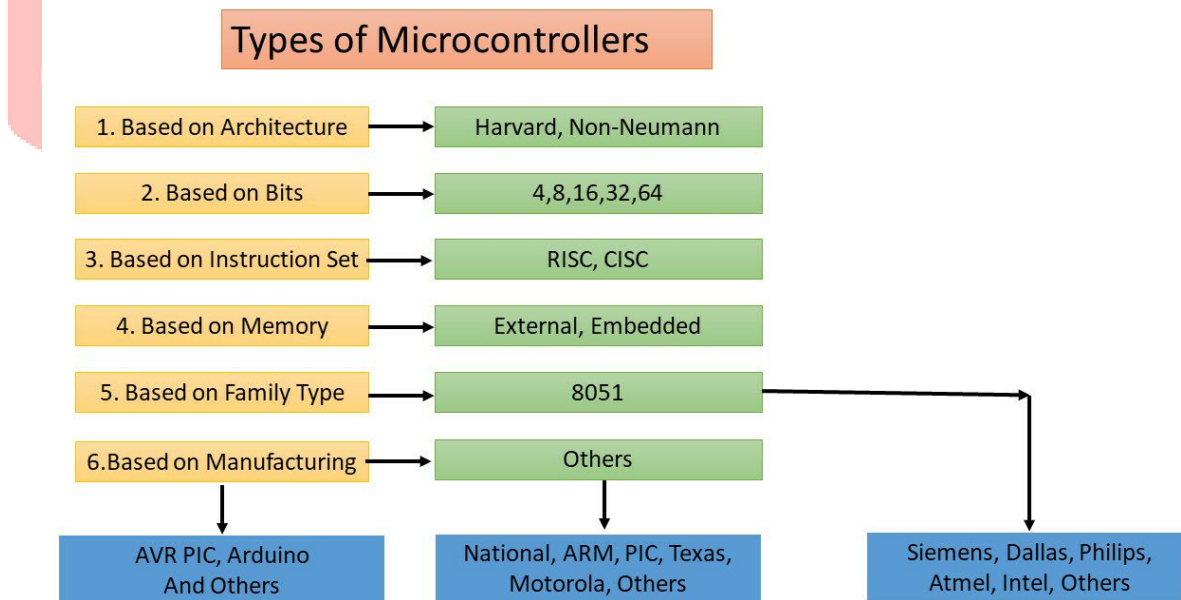


Fig.7. Microcontrollers classification

Outputs of two sensors are given to microcontroller input port Micro-controller will calculate the level and also store the data in memory.

Accordingly actual water level is indicated with the help of LCD display in digits. Some features of 89C51 are as follows

- 8051 central processing unit
  - 4k \* 8 ROM
  - Three 16 bit counter\timers
  - Boolean processor
  - Low voltage (2.7V to 5.5V @ 16MHz)
- Memory addressing capability
  - 64k RAM & 64k ROM
- 4 level priority interrupt
- 8 Interrupt sources
- Four 8 bit I/O ports
- CMOS and TTL compatible
- Extended temperature ranges
- Asynchronous port reset
- Low EMI

### 3) Transmitter and Receiver circuit:-

In this part we are doing transmission of data using MICRF high speed low power UHF data transceiver module. UHF range is shown in following frequency Table 1.

Table 1. Frequency Table Indicating UHF Band

Frequency Range	Name of Frequency Band	Applications
10 Hz to 30 kHz	VLF (Very Low Frequency)	Point to point communication over a short distance only.
20 Hz to 20 kHz	Audio frequency	Carries various audio signals.
30 kHz to 300 kHz	LF (Low Frequency)	Marine and Navigation purpose.
300 kHz to 3000 kHz	MF (Medium Frequency)	AM Broad-cast purpose (550 kHz to 1650 kHz)
3 MHz to 30 MHz	HF (High frequency)	Point to point communication in the short wave range (SSB or military application).
30 MHz to 300 MHz	VHF (Very High Frequency)	T.V., Radar communication.
300 MHz to 3000 MHz	UHF (Ultra High Frequency)	Micro-wave communication.
3 GHz to 30 GHz	SHF (Super High Frequency)	Satellite
30 GHz to 300 GHz	EHF (Extra High Frequency)	Micro-wave + Satellite

The transmitter will be utilizing the Micrel MICRF 102 transmitter chip. The circuit will also incorporate an oscillator and single loop antenna.

This device is a true data in antenna out monolithic device. It uses the novel architecture where the external loop antenna is tuned to the internal UHF synthesizer. The IC is compatible with virtually all ASK UHF receiver types from wide band super regenerative radios to narrow band high performance super heterodyne receivers.

**Features:**

- Complete UHF transmitter on monolithic chip
- Frequency range 300 Mhz to 470 Mhz
- Data rates up to 20kbps
- Automatic antenna alignment, no manual adjustment
- Low external part count
- Low standby current

The receiver will be developed using the Micrel MICRF 007 receiver chip. The circuit will also consist of an oscillator and monopole antenna. This device is a true antenna in data out monolithic device. All RF and IF tuning is accomplished automatically within the IC which eliminates manual tuning and reduces production cost.

It is a conventional superheterodyne receiver with an local oscillator fixed at a single frequency based on a external reference clock. Data rates up to 2 kbps is possible.

**4. features:**

- Complete UHF receiver on monolithic chip
- Data rates up to 2.1 kbps
- Low power consumption
- No filters or inductors are required
- Automatic tuning, no manual adjustment
- Very low RF re radiation at the antenna
- CMOS logic interface

**5. Comparison with system in existence :**

- Water –Level Sensor Shaft Encoder Model AD375A available in the market is expensive.
- Model which uses the Ultrasonic technique is temperature dependent.
- Model which uses the LVDT gives less resolution and is temperature dependent.

**Advantages :**

- Simple in construction and economical .
- Temperature independent.
- Compatible with the resources available at the site.
- As solar panel is used device is free from any power shortage.
- Robust.

**Disadvantages :**

- Somewhat heavy compared to other before installation
- Due to float and pulley arrangement friction must be taken into consideration.

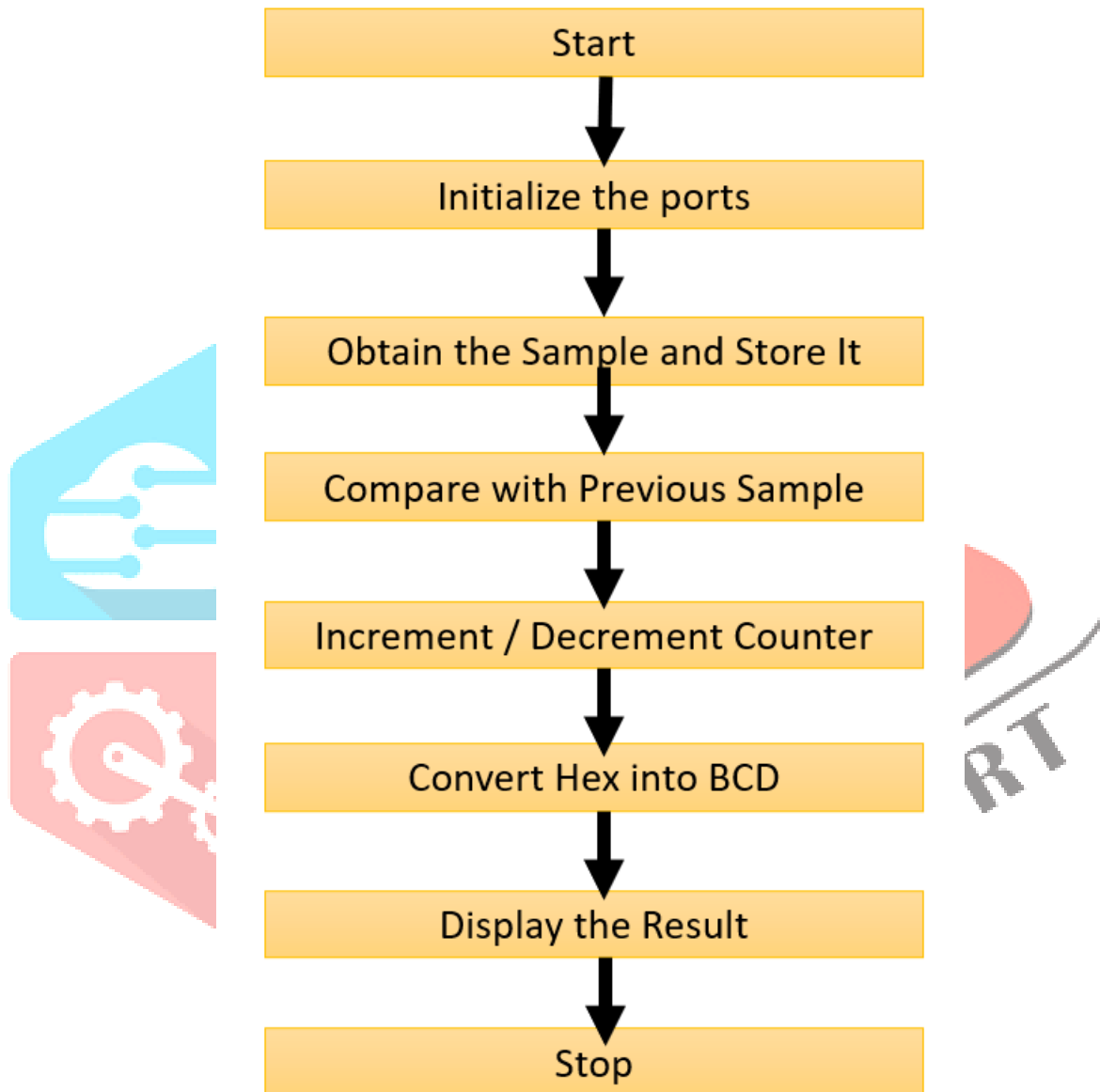


Fig. 8. Typical Flowchart

**Conclusion :**

We have designed water level indicator using float and pulley arrangement and quadrature encoder. The module is simple in construction and gives good resolution. Using transceivers module water level at the dam site can be recorded at other site. Also, we have seen that role of mechatronics system plays important role of processing and control.



## References :

- [1] G.S. Mundada and Zakee Ahmed, "Recent Trends in Mechatronics for Sustainable Development in Engineering", Annual Technical Volume of ETDB, The Institution of Engineers, Volume 2, PP:09-13,, Dec 2018,ISBN: 978-81-939709-0-4
- [2] G.S. Mundada, Zakee Ahmed and Ramteke, Rasal, "Opting Suitable Data Acquisition System for Environmental Temperature Analysis : NI-MyDAQ vs Arduino Uno", Recent Trends in Mechatronics for Sustainable Development in Engineering, Annual Technical Volume of ETDB, The Institution of Engineers, Volume 2,PP:50-53,Dec 2018,ISBN: 978-81-939709-0-4
- [3] G.S. Mundada & Zakee Ahmed, "Exploring Mechatronics System and Technical Investigation of Hydraulic and Pneumatic System Maneuver for Archetypal Engineering Applications", 33rd Indian Engineering Congress 2018, Annual Technical Volume 2018,PP:359-364,Dec 2018,ISBN: 978-81-938404-9-8
- [4] G.S. Mundada & A. Deshmukh, "Integration Technology using Information and Communication Technology for Problem based Learning and Teaching Learning Process" 33rd Indian Engineering Congress, Udaipur: 2018,Annual Technical Volume 2018,pp: 390-394, Dec 2018, ISBN 978-81-938404-9-8
- [5] G.S. Mundada, "Systematic Performance Analysis of Bit-Torrent Traffic"Journal Helix, The Scientific Explorer,Volume 9 (2),pp: 4858-4863,April 2019,E-ISSN: 2319-5592; P-ISSN: 2277-3495DOI 10.29042/2019-4858-4863
- [6] G.S. Mundada & A. Deshmukh, "An amendment of 3 T (Technology, Trend, Target) using IT (Indian Talent) for Indian Engineering: a vital technocracy of Smart City",34th Indian Engineering Congress 2019,Annual Technical Volume 2019,pp: 325-331,Dec 19,ISBN: 978-81-942561-5-1
- [7] Dr. G.S. Mundada and Ms. Amruta Mane, "Implementation on Tomato Cutter Robot using Image Processing and Raspberry PI",International Journal of Scientific & Engineering Research, Volume 12, Issue 1, January-2021,pp 379-382,Jan 21,ISSN 2229-5518
- [8] Anvesh Inamdar & G.S. Mundada, "Design and Fabrication of Magnetic Loop Antenna for 5 MHz", International Journal of Innovative Technology and Exploring Engineering (IJITEE), Volume-10, Issue-4, February 2021, Pp 29-32, Feb 21, ISSN: 2278-3075
- [9] G. S. Mundada, Adesh Thakur, Sanket Saklecha and Ankush Indulkar,"Smart Spine Posture Detector", International Research Journal of Engineering and Technology (IRJET) IF: 7.529, Volume: 09, Issue: 05, Pp 25-28,May 2022,e-ISSN: 2395-0056,p-ISSN: 2395-0072.
- [10] Chinmay C. Alpe, Harshita Pandey, Shruti Kolte and G. S. Mundada, "Solar-powered Reconnaissance Robot", International Journal of Novel Research & Development (IJNRD),Volume 7, Issue 5,PP: 326-334 May 2022'ISSN: 2456-4184
- [11] Shravani Dhas, G.S. Mundada,"GSM based Fuel Theft Detection",International Journal of Innovative Research in Engineering (theijire),Volume 3, Issue 2,pp-154-159,Apr.2022, ISSN No: 2582-8746
- [12] Aryan Bagade, ,"Metaverse Simulation Based on VR, Blockchain, and Reinforcement Learning Model",International Journal for Research in applied science and Engineering technology (ijraset),Volume 10, Issue X,Pp 67-75,Oct 2022,ISSN: 2321- 9653.