

## LOW COST PORTABLE DIGITAL MEASURING WHEEL FOR TELECOMMUNICATION CONSTRUCTION FIELD

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### ABSTRACT

The primary object of this invention is to provide improved measuring device having a ground engaging wheel which has a circumference which is an exact multiple of a measuring unit so that the wheel may be engaged with counter sensor. IR sensor was used as the counter sensor. The IR sensor TX directly in front of the RX, such that almost all the radiation emitted, reaches the RX. This creates an invisible line of IR radiation between the IR TX and the RX. The number of circle detected from the IR sensor and to counting number of circle done from the microcontroller. The microcontroller is calculated distance using by their ALU (Arithmetic Logic Unit) and distance send to LCD display. The buzzer indicates the alarm. The Venire caliper should be used to measure the radius of the circle. The 16F887A should be programmed by using MikroCsoftware.

**Keywords:** *Liquid Crystal Display (LCD), Microcontroller, Transmitter (TX), Receiver (RX), Infrared (IR).*

### 1.0 INTRODUCTION

Presently construction field rapidly developing in Sri Lanka similarly instrument is should be user friendly. This research relates in general to measuring device, and more specifically to portable digital measuring wheel for rolling along the surface to be measured. In generally many measurements along the ground, it has been customary to utilize tapes, either steel or fabrics, which are awkward to handle, require computation, and necessitates two persons to handle same. Also existing analog wheel meter cannot be used at night. It is readily apparent that there is a need for a measuring device which may be operated by one person and would provide an accurate tabulation of the distance measured<sup>1</sup>. In analog meter reset button not smooth. By considering these drawbacks, an improved digital wheel meter was introduced.

## 2.0 EXPERIMENTAL

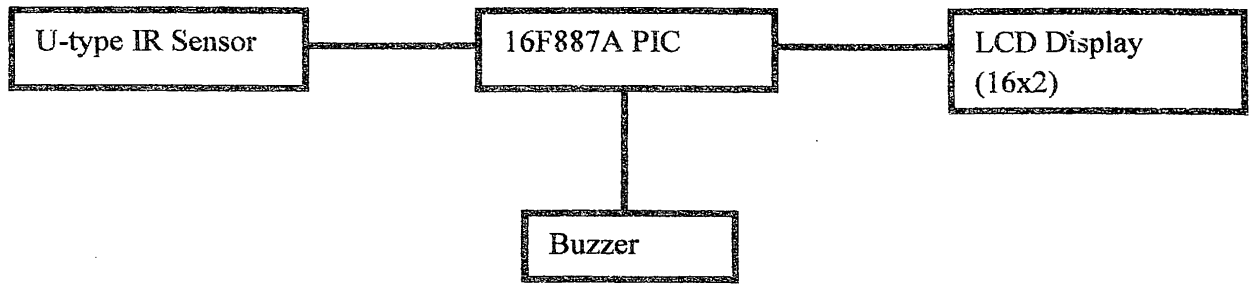


Figure 1: The proposed Digital Wheel meter Block Diagram

The circuit of the project should be connected as above figure. The IR sensor which shows in first box counts the number of rotation. Since the output of the IR sensor is weak voltage it should be amplified into logic level before send it to PIC. The amplified of IR sensor output should be sent to PIC. The distance was calculated using PIC it was sent according to out of the sensor and to LCD display. The LCD display was connected with microcontroller properly. Then an output distance was showed in units by meter and feet. The alarms were set at 35m one beep and 40m two beeps. Digital Wheel meter was implemented using the circle radius calculation which was done by following equation.

$$Length = 2 \times \pi \times r \times n \quad (01)$$

Where;

$\pi$  - Constant (22/7)

r – Radius of circle

n – Number of rotation

The designed digital meter measures 50cm (0.5m) when rotates one circle. The radius of designed wheel is 7.9545cm. The Vernier caliper should be used to measure the radius. The 16F887A should be programmed by using MikroC software<sup>2</sup>.

The meter to feet conversion was done by following equation.

$$Distance \text{ in feet} = \text{meter value} \times 3.280839895 \quad (02)$$

### 3.0.RESULTS AND DISCUSSION

The main result of this project was to replace existing analogue measuring meter with electronically developed digital measuring meter cost effectively.

The system was indicated the relevant distance with the help of an alarm. The distance was shown by meter an feet at same time. Especially there should be a circuit to amplify. The weak signal which comes from the IR sensor can be amplified to high level voltage. LM358 is the major part of the Amplification. If there is an obstacle between IR transmitter and receiver the output goes to high<sup>3</sup>.

The IR sensor TX directly in front of the RX, such that almost all the radiation emitted, reaches the RX This creates an invisible line of IR radiation between the IR TX and the RX. Now, if an opaque object is placed obstructing this line, the radiation will not reach the RX and will get either reflected or absorbed by the obstructing object. This mechanism is used in object counters and burglar alarms. This is also called as direct incidence<sup>4</sup>. U-type IR sensor are also worked as direct incidence.

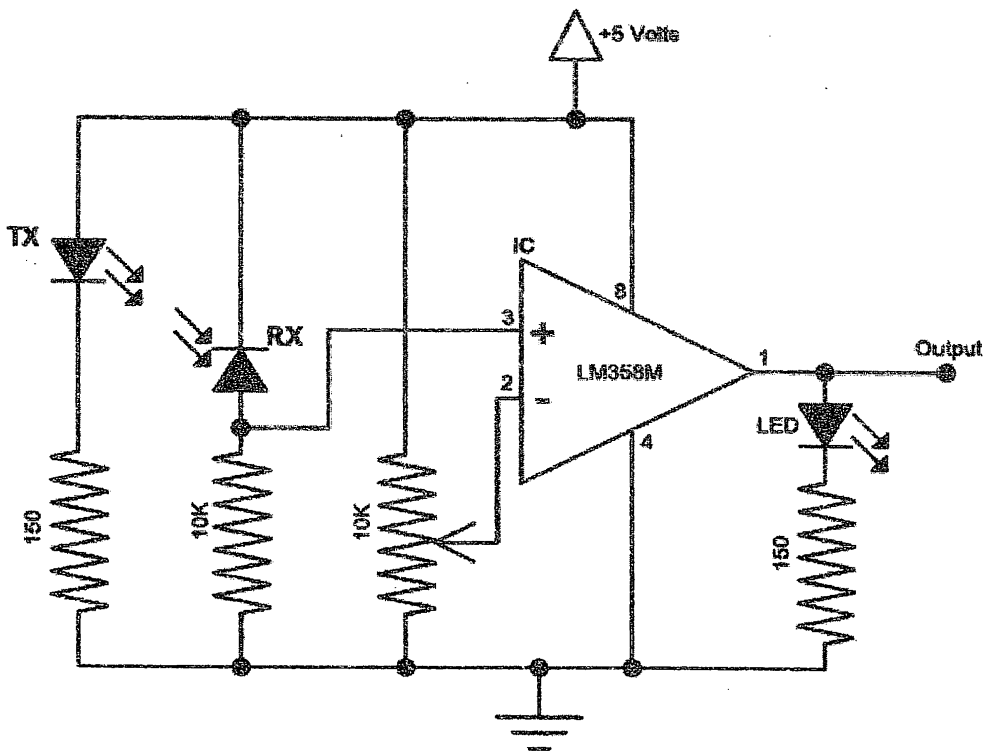


Figure 2: The Amplifier Circuit<sup>5</sup>

The comparison of the Analog meter wheel and Design Digital wheel meter is shown in the following table.

**Table 1:** Comparison of Digital meter wheel and Analog meter wheel

Design Digital meter Wheel	Analog Meter Wheel
Inexpensive (Low Cost)	Expensive
Resetting smooth	Resetting not smoothing
Suitable for night working site	Need external light source
Low weight	Heavy weight
Indicate distance from several units	Only in meter (m)
Alarm to indicate 40m	No alarm
reduce safety issued	Safety issued

Another advantage of this invention is to provide an improved measuring device for accurately measuring linear distance said device being of a compact and simple construction whereby it may be economically implemented.

Safety first is the main rule in engineering field. When measurements take along the road required more attention to road. But analog wheel meter required attention also for the meter readings as well as the road. Then safety problem occurs. It can be avoid from buzzer alarm.

As a further development, this can be improved to use battery charger with solar panel to be charged rechargeable battery.

#### 4.0. CONCLUSION

The purpose of the project was to design a low cost Digital wheel meter with an alarm unit. It can be also used for the night working sites to get their measurements accurately and user friendly.

#### ACKNOWLEDGEMENT

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## REFERENCES

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