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Water Sensing Shoes

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Abstract: ***Technology is advancing day-by-day with new advancement in each product. Despite its simplicity, a shoe is a very useful daily used product. A shoe is an item of footwear used to protect and comfort the human foot. Shoes are also used as a fashion product. Shoes have varied enormously through time and from culture to culture, mostly in appearance only. But only little technological advancement has been done in this product. Coming decades are a decades of smart product. A Smart product means a user friendly, multitasking product.Our water sensing shoes is on same lines which has features which are helpful in daily life. Water Sensing shoes is a product which automatically reacts to water (mainly rain) by tightening the rim of shoes while it is raining or when shoe comes in contact with large amount water like in potholes. It also as a feature of mobile charging. Rather than using portable mobile charger, it is better if we have charging slot in our shoes and a mobile holder attached to user's legs for this purpose.***

Keywords: Voltage Regulators, Sensor, Motor, Astable mode, IC555.

I. INTRODUCTION

This decade is a smart products decade .Our mobiles, watches, TV etc. are becoming smarter with advancement and new ideas. What exactly our paper aims at? We propose innovative shoes which are water sensitive and thus help in solving the problem of water entering the shoes from its rim during rains. For this purpose it uses a copper clad as a sensor which indirectly controls the motor. Everyone need to carry mobile with them and so it need to be charged all the time. It has become a necessityIt also has a special feature of mobile charging slot. Mobile charging can be done by hanging the mobile in mobile holder which will be attached to user's leg and the mobile can be connected to charging slot using USB. So this product can be a very useful thing for people who do trekking in rainy areas where there is no possibility of any charging slot.

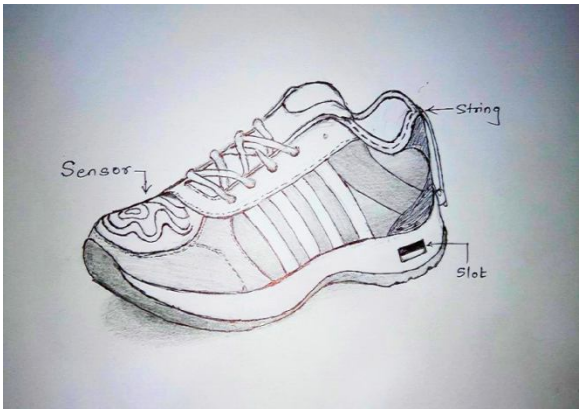


Fig. 1 Sketch of Water Sensing Shoes

II. WORKING PRINCIPLE

A. Water Sensing Circuit – In our circuit mainly has following components IC555 which works in astable mode; driver IC which is further connected to motor; then a water sensor and a comparator. Whenever water falls on shoes the sensor gets activated and thus motor starts running. The motor output is connected to both ends of strong thin string. The string is wrapped across the rim of the shoe; within the shoe material. The string ends are connected such that whenever the motor runs; the string get pulled from both ends and thus tightening the rim of shoes. During no connection in sensor i.e. no water (rain) the output to motor driver IC is zero so the motor is still and thus rim of shoes is in its normal position.

B. Mobile Charger – Rather than carrying a charger and searching for slot it is better to have a mobile charging facility with us which is provided in our shoes. Just we need to place our mobile phone in mobile holder and then connect it with USB cord to

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the charger slot in shoes. Voltage regulator is required for this purpose as our mobile can be damage due to fluctuating voltage. Zener diode is also used as it works as constant voltage diode in reverse biased condition.[4]

III. CIRCUIT DIAGRAM

A. *Water Sensitive System*

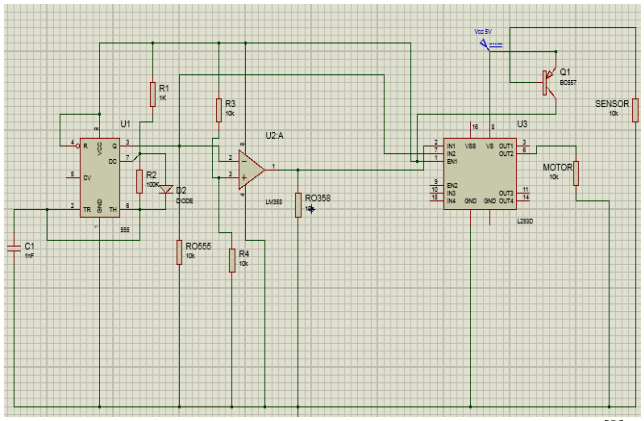


Fig.2 Circuit diagram of Water Sensing system (Proteus) [3]

B. *Mobile charging system*

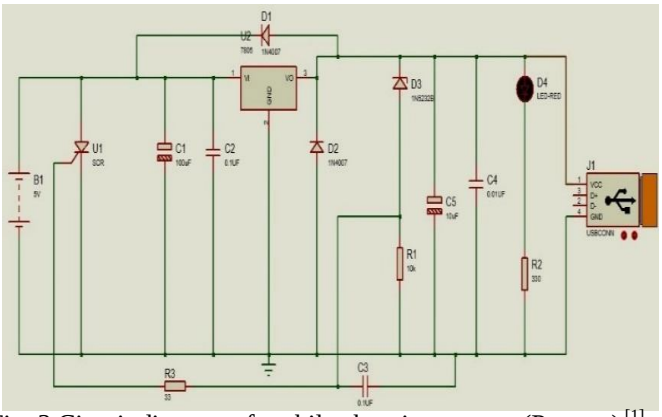


Fig. 3 Circuit diagram of mobile charging system (Proteus) [1]

IV. DESCRIPTION

A. *Water Sensing Circuit*

1) IC555- IC555 has 3 modes of operation; one of it is astable mode. In this mode both state are quasistable state. We can adjust the T_{on} and T_{off}time by adjusting resistors value of R1 and R2. In our case the duty cycle must be between 65% to 90%. So that our circuit can work effectively. Designing more than 90% duty cycle is too difficult practically.

Duty Cycle $=\frac{R1+R2}{R1+2R2} * 100$

2) Comparator LM358- Output of AstableMultivibrator is directly connected to inverting pin of Comparator LM358 and Pin No 7 of Motor Driver L293D. Output of comparator is directly connected at pin 2 of motor driver IC. Comparator LM358 IC is used here for comparing IC555 output voltage and reference voltage across comparator's non inverting terminal set by using Voltage Divider Circuit (R3 and R4).

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3) Motor Driver IC L239D- L293D is a dual H-bridge motor driver integrated circuit (IC). Motor drivers act as current amplifiers since they take a low-current control signal and provide a higher-current signal. This higher current signal is used to drive the motors. . The L293D is designed to provide bidirectional drive currents of up to 600-mA at voltages from 4.5 V to 36 V[2]

4) Sensor- Copper clad is used as a sensor for this purpose. Whenever water (rain) falls on the clad the two copper layers on clad designed using etching process; gets connected. Thus completing the circuit and motor runs.

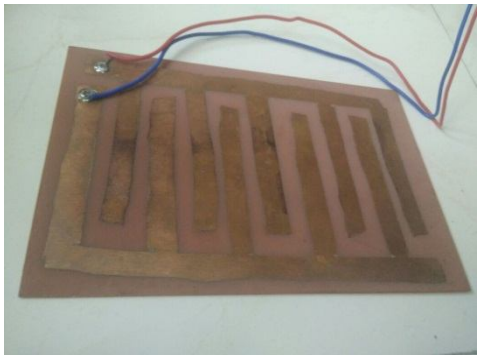


Fig.4 Copper Clad as a Sensor

5) Charging- The important component in the circuit is the IC 7805, which is a 5V voltage regulator that allows a maximum current of 1.5A. Hence, the mobile can be charged with a maximum current of 1.5A. The Zener diode ensures that the output voltage doesn't exceed 5.6V and in case the output voltage exceeds 5.6V, the Zener diode switches on the SCR and the input to 7805 is cut off. The output of 7805 is connected to a female USB connector and from which a mobile can be charged. [1]

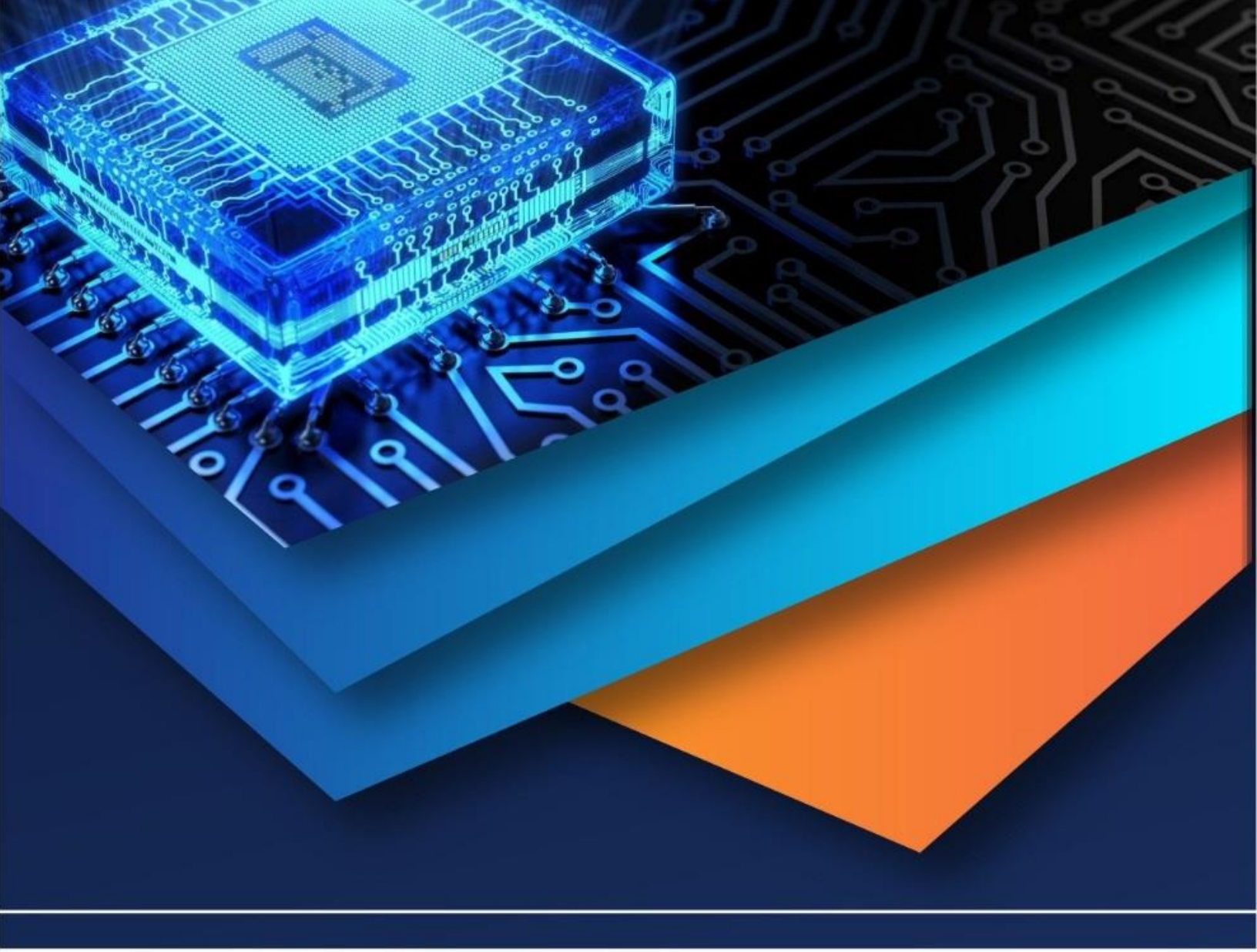
V. CONCLUSION

Water sensitive shoes provide more comfort while travelling during rainy season or while trekking in watery area. There is lot of scope for adding more features to this product and thus making it more users friendly. The sensor of this circuit can improved by making changes in clad or using a different, more precise sensor. . With future modern technologies, there could still be a lot of horizon in improving and advancing this product.

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