IICDC PROPOSAL

TEAM ID: 1448353

COLLEGE NAME: SARDAR PATEL COLLEGE OF ENGINEERING

TITLE: WATER ELECTROCUTION ALERT SYSTEM

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WATER ELECTROCUTION ALERT SYSTEM

2.0 Business Details

A. Project Abstract :

1. The problem that our project intends to solve :

- There have been many recent cases of fatal injuries due to electrocution in water. Many times faulty pool lights cause electricity to flood the pool or hot tub, causing fatalities.
- To avoid such circumstances our idea is to develop a 'Water Electrocution Alert System'. By constantly checking leakage voltage in a water body (e.g. Swimming pool) we can immediately send an alert to the concerned authorities and avoid accidents.

2. A brief abstract our idea/problem being solved :

The sensor probes of our system will be fixed inside the water body whereas the system will be placed its vicinity. Whenever there is a leakage voltage that exceeds the threshold value (voltage beyond which the water body can conduct electricity), an immediate alert will be sent via internet to smart-phones along with an alarming sound made by the buzzer. Because of the alarming sound, the nearby people will be alerted and the area will be restricted to enter. If this system is implemented as per our idea a huge amount of accidents can be easily avoided.

3. Why does solving the problem matters ?

- As electricity in water cannot be seen or heard, the presence of it becomes more dangerous. Many people are unaware of electrocution in water. Electric shock drowning is a term used in the USA to describe a cause of death that occurs when swimmers are exposed to electric currents in the water.
- In some cases, the shock itself is fatal, since the person will suffocate when their diaphragm is paralyzed, while in others it incapacitates the swimmer causing them to drown. Chlorine is used in swimming pools to kill bacteria and germs. Due to it (Chlorine), the water in swimming pools is more prone to pass electricity.

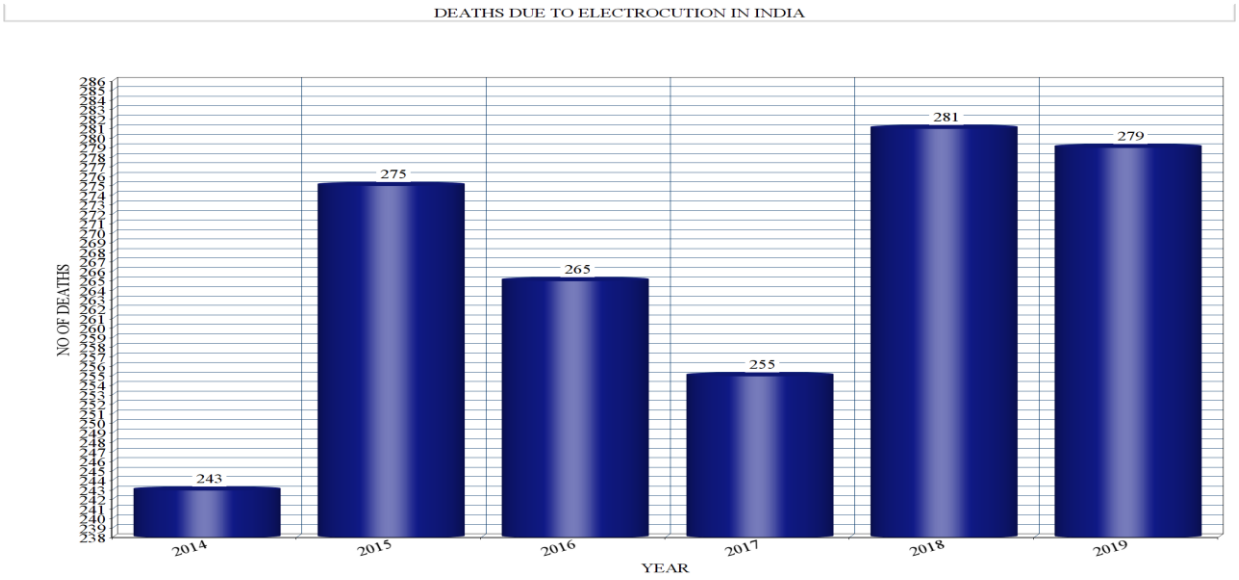
FEATURES :

MSP432P401R micro-controller by TI (MCUs) is optimized wireless host MCU with an integrated 16-bit precision ADC, delivering ultra-low-power performance including 80 µA/MHz in active power and 660 nA in standby power. Thus giving a high energy efficient performance. Also by the use of TI based MSP432P401R MCU has made the device very reliable in terms of safety and life.

B. Market Analysis

a) Customer Need Identification :

Following bar graphs provide the data on the number of deaths due to electrocution in India.



According to the survey conducted, product features required for fulfilling the basic needs of our customers include :

1.Fair price

2.Long term usage

3.Miniature design

4.Rapid response

5.Portable

6.Good service

7.Low maintenance cost

8.High quality

9.User-friendly

b) Serviceable Addressable Market (SAM) Identification & Justification :

1.Clients :

A]Clubs (with swimming pools)

B]Backyard swimming pools

C]Fountains

D]Private Docks

E]Boat lifts

F]Marina

G]Hot tubs

Existing problems faced by entities -

Faulty bonding/grounding is the cause of many electrocution incidents.

Proposed solutions (reasons for buying) -

- ✓ In case of the above mentioned area, our customers and users will be sent a message on their smart phones whether the area is electrocuted or not.
- ✓ If its area is larger than that of the range of sensors, more sensors can be placed.
- ✓ At such times, the portion of the area that is electrocuted will be displayed.

2.Government :

Existing problems faced by entities -

a. Heavy rains often cause flooding in lowland regions.

b. Electricity would travel through the water and through you to the ground.

Proposed solutions (reasons for buying)-

- ✓ In case of flooding, citizens in the vicinity of the flooded region will be sent data and an alert immediately about the electrocution.
- ✓ Data will also provide the portion of the regions that is electrocuted.

c) Product Differentiation w.r.t. Competition & Justification :

Competitors :

1. SHOCK-GUARD 24/7

Shock-Guard indicates electrocution by a buzzing sound.The unit will sense electricity in fresh, salt, brackish or chlorinated water.But the main disadvantage of this product is that it is expensive , it costs 295$ for a normal usage. The price increases to 595$ if more sensor probes are needed.

2. *ShockAlert*

It is a compact device which we need to advance in the area that consists water. It consists of an indicating light at the top which turns green if there is no electrocution and turns red when the water is electrocuted.

Difference between **our team** *Idea* & competitors:

- ✧ The sensors of our device needs to be positioned at required places i.e. it is stationary.
- ✧ The user need not check any indicator situated at the water logged area by actually going near it.
- ✧ Data is sent directly on their devices.
- ✧ Installation is easy.
- ✧ Our product is cheaper.

d) Understanding of your customer & user:

1. Government can act as the customer who purchases our product which will then be situated in the lowland areas. In such a case, its citizens will be the users.

2. Society secretary, club owners, private swimming pool owners can be our customer buying our product which can be used for detecting electrocution in swimming pool. In this case, the society members or the swimming pool owners will act as users for our product.

e) Distribution Channel Identification:

- ➢ Sensors will be placed inside water body i.e. flooded areas or pools.
- ➢ Microprocessor will be placed in its vicinity (outside the water body).
- ➢ Alert will be sent to devices when water body is electrocuted

3.0 Technical Details

A. Product Brief :

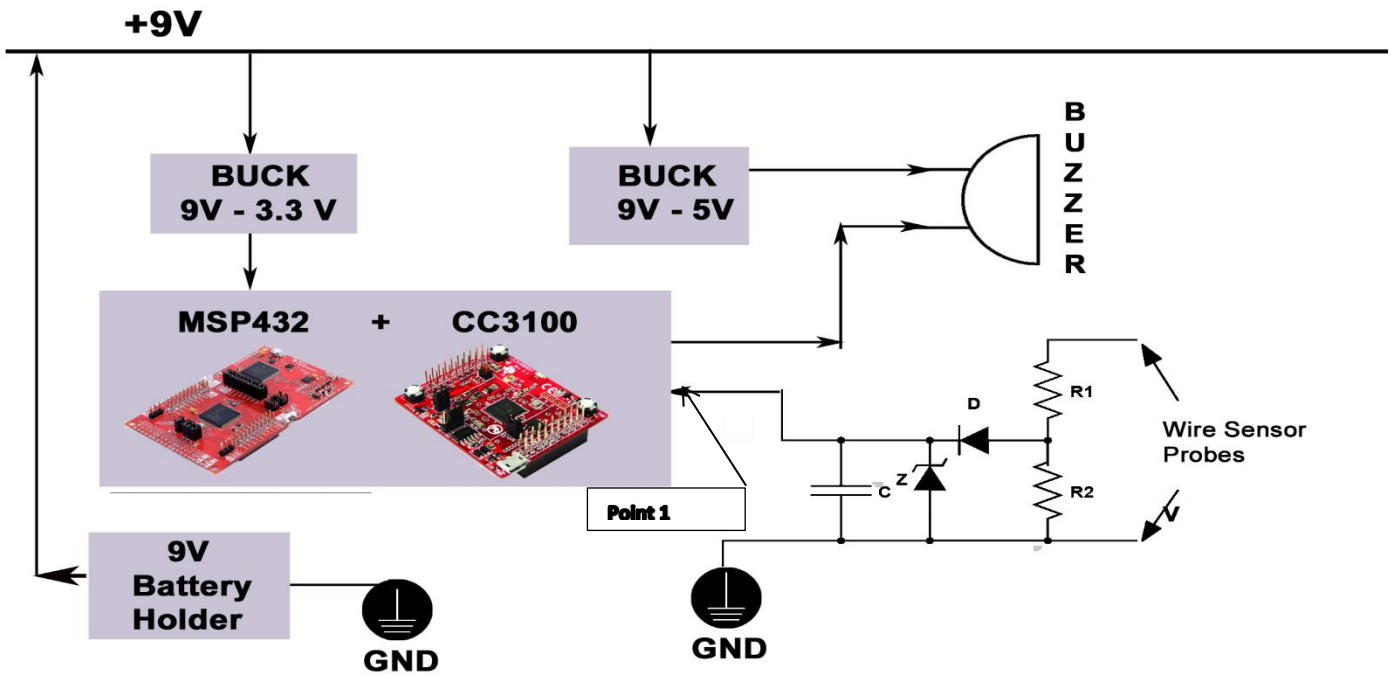
1. **Core Technical innovation :**
   Our core technical innovation is to provide a complete solution to water electrocution problems. By using Internet of Things (IoT), the bandwidth of reach to our users becomes wider. Also the system is quite simple to operate and easily repairable.

2. **Uniqueness of our product design :**
   Connectivity to internet is what makes our product unique. Other products in market only provide an alarming sound to electrocution. Our product not only triggers an alarm but also sends a notification to the concerned authority via Internet.

3. **Objective :**
   Electrocution can cause fatal injuries. Electronic devices to avoid electrocution are available in the market but they are very exorbitant and not very efficient. To avoid such circumstances our idea is to develop a 'Water Electrocution Alert System'. Whenever there is a leakage voltage that exceeds the threshold value (voltage beyond which the water body can conduct electricity), an immediate alert will be sent via internet to smart-phones along with an alarming sound made by the buzzer.

B. Proposed Idea :

Circuit Diagram :

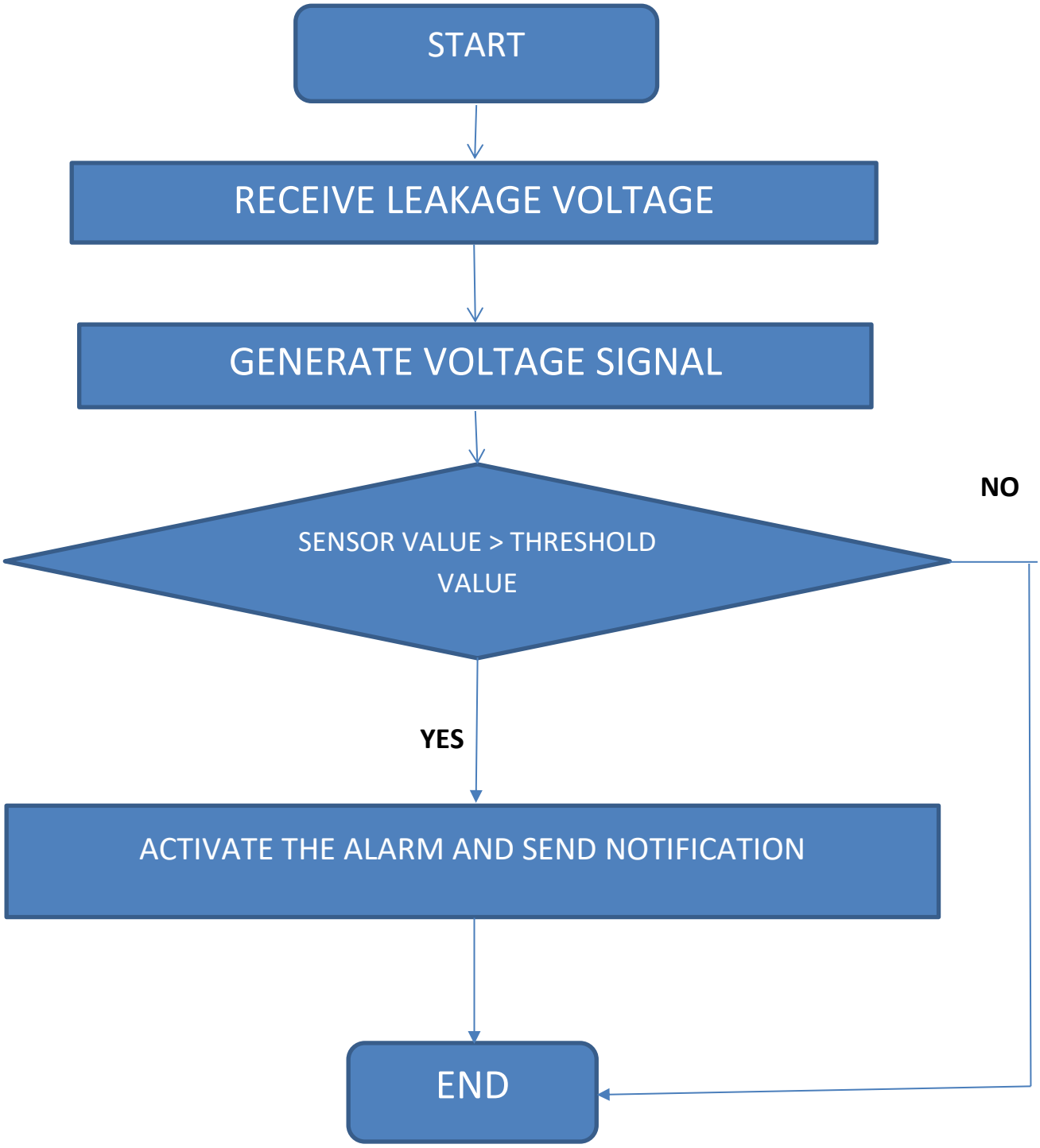


The main device is powered by a 9v rechargable battery. The 9v-3.3v buck is used to power microcontroller. The zener diode is used to provide a constant voltage if the voltage across the sensor probes is greater than the threshold voltage of the zener. Potential divider bias is used to step down the voltage. The diode acts as a half wave rectifier. Capacitor C is used to suppress signal noise. The analog value at point **1** is given to the microcontroller which acts as the sensor value. If the sensor value is greater than the threshold value then the microcontroller drives the buzzer.

Values: R1 = 200k ohm, R2 = 20k ohm potentiometer, Z = 5 Volt, D = 0.7v diode, C = 1 microfarad.

Also with the help of IOT shield notification is sent via internet.

FLOWCHART OF IDEA



C. Innovativeness of the proposed design:

- Our system is designed by considering all the potential problems that could arise while its use and also the customer's safety is well ensured.
- The water electrocution alert system is a quintessential product and will be made available at an affordable cost
- The use of TI based MCU has made system resilient which makes our system effective and adaptable.
- Further alterations can be done by our team in the system as per the customer need and this makes it different from others.
- Energy consumption is very low and it can sustain temperature differences in atmosphere. Also use of IOT in the system has provided an edge over the other competitors.
- The system comes with rechargeable batteries already provided by the team.

D. Impact of the proposed solution:

- The Water Electrocution Alert system will make a great impact at the time of floods and also for the operations in the water bodies.
- Many lives can be saved if the system is installed.
- Many a times cattle, pets, children tend to saunter in restricted areas near the water bodies where there can be a potential electric supply which can be dangerous for their lives. At such places our system can detect the supply and send an alert to the surrounding by a buzzer and a message to the concerned authority which will take care of the leakage. This will prevent loss of lives of not only human but also animals.