



# Flood Water–Triggered Safety System for Electricity



*Big Idea | Safe Power, Safe Life*

*Essential Question | How can flood-level monitoring protect home electrical systems and send automatic notifications?*

*School/Organization | SMKN 1 Paringin - Light community21, Balangan, South Kalimantan, Indonesia*

## Real-World Problem

1. **Property damage and economic losses**
2. **Safety risks to residents**
3. **Electricity often remains active during floods due to the lack of an automated local response system.**

**SDG'S :**

Flood Impacts in Balangan Regency,  
(<https://www.kompas.com> 2025)



**Good Health  
and Well-Being**



**Industry, Innovation,  
and Infrastructure**



**Sustainable Cities  
and Communities**

In Balangan Regency, South Kalimantan, flooding is a disaster that is not only seasonal but also routinely threatens the safety and livelihoods of the community. Recent data show that by the end of December 2025, floods had affected approximately 13,531 people and 4,156 houses across around 30 villages in five districts of Balangan Regency, due to extreme rainfall and overflowing rivers.

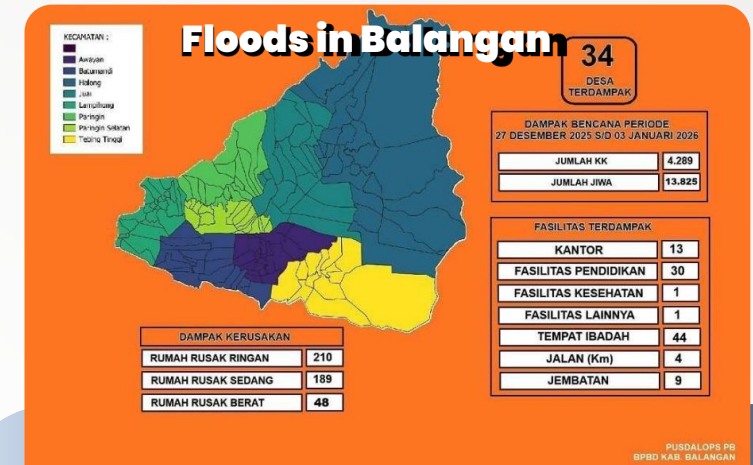
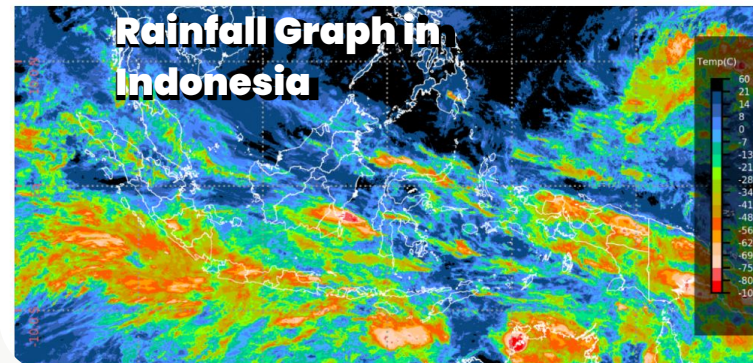
# Why Choose This Topic ?

This topic was chosen based on the identification of the following issues:

- **Flooding frequently** occurs in Balangan Regency, South Kalimantan, with repeated events from 2021 to 2025 reaching water levels of up to 2.22 meters and affecting approximately 13,531 people and 4,156 houses due to **extreme rainfall** and river overflow.
- Submerged household electrical installations pose a **serious risk of electric shock**, with People News (2024) reporting fatal incidents during floods in Indonesia
- Limited availability of early warning tools and simple, easily accessible electrical safety systems at the local level

BMKG: Waspada Peningkatan Curah Hujan di Sebagian Wilayah Indonesia menjelang Akhir Januari

20 Januari 2026 / Dwi Herlambang / Siaran Pers



Flooding often occurs unexpectedly, while electricity disconnection still depends on manual intervention; therefore, a local system that can monitor water levels and respond automatically is required.

**Essential Question:** How can flood-level monitoring protect home electrical systems and send automatic notifications?

# Challenges in the Project



Rescue Process in Balangan,  
(<https://www.kanalkalimantan.com> 2019)

Government efforts in **flood mitigation** related to river conditions are still not optimal, including:

- **Rapid and hard-to-predict** increases in flood water levels with limited information available to residents
- The **absence of community**-based real-time river monitoring, along with the lack of automatic notification systems.
- **Early warning** systems are often received too late and are unable to protect household electrical systems.

- The community **lacks awareness** of the risk of electric shock during floods, which can cause injuries, burns, trauma, and even death.



Submerged house in Tebing Tinggi, Balangan Regency,  
(<https://eksposkalim.com> 2025)



How can **conventional power shutdown** systems that rely on manual intervention effectively respond to sudden **increases in water levels?**





Flooding in Balangan Regency is caused by various factors, with its impacts further exacerbated by the low level of public awareness of other hazards that arise during floods.



**Awareness**

The community still has limited awareness of electrical safety risks during and after flooding.



**Risk**

Serious health risks, including electric shock, burns, trauma, and the potential for death



**Rainfall**

Flooding in Balangan Regency has become increasingly frequent due to extreme rainfall, deforestation, and changes in land use.



**Safety**

There is no electrical installation safety system that can operate automatically when flooding occurs.

## Flood and Electrical Hazard

1. Residents' homes often remain connected to the power supply during floods
2. Floodwater can conduct electricity
3. Submerged electrical installations increase the risk of short circuits
4. Electrical hazards are often overlooked by the community

## The Impact of Electrical Short Circuits During Floods

### Risk of Electric Shock

Floodwater can conduct electricity, thereby increasing the risk of electric shock for residents and other living beings who remain in their homes or in flooded areas.



ReportaseBanten.co.id, 2021



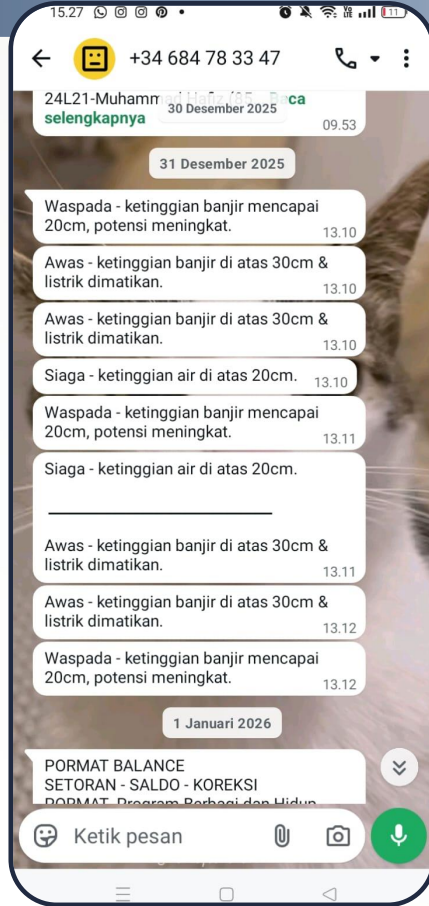
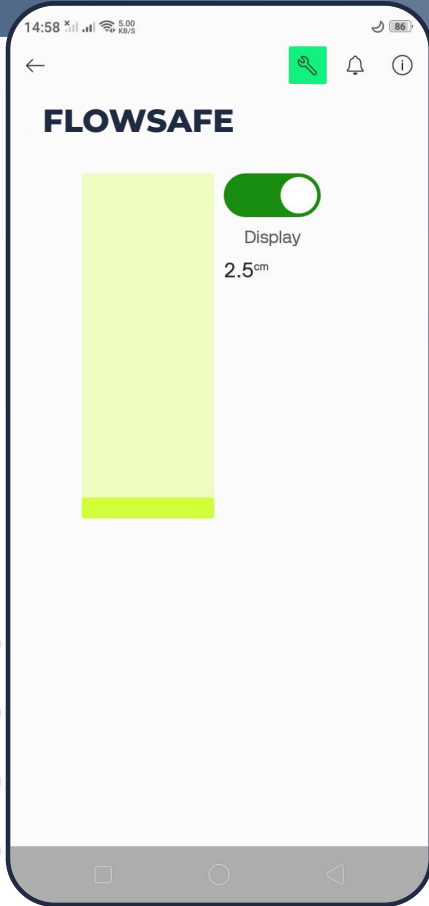
Damaged electrical equipment  
(Canva Edu, 2026)

### Fire and Equipment Damage

Flooding that submerges electrical installations increases the risk of short circuits, fires, electric shocks, and permanent damage to electrical equipment, endangering the safety of residents.



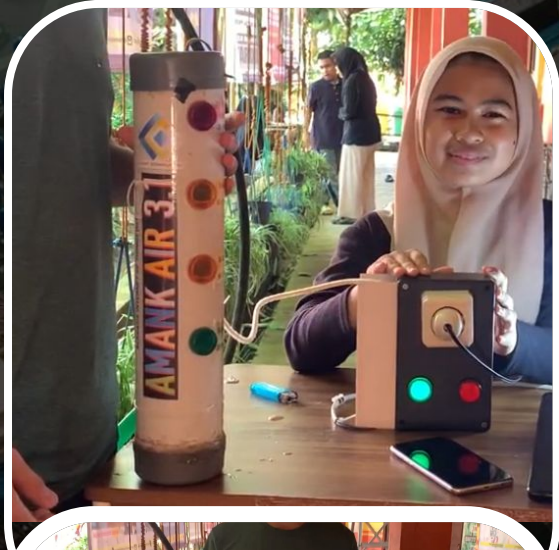
Damaged electrical equipment  
(Canva Edu, 2026)



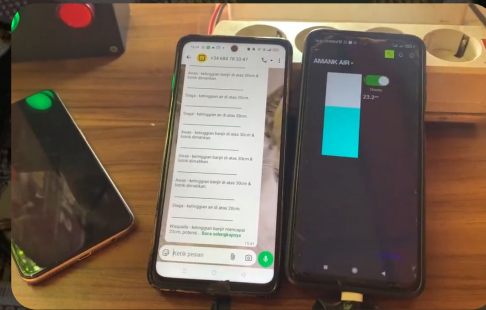
Based on the results of the investigation, a system is needed that can monitor water level conditions in real time and in an integrated manner for all users, as well as prevent electrical short circuits. The following is the analysis of the system to be developed:

- **Automatic water level detection (Real-Time Water Level Detection)**
- **Automatic power cut-off and restoration (Automatic Power Cut-Off & Recovery)**
- **Audio-based local emergency alert (Local Emergency Alert)**
- **IoT-based remote monitoring and notification (Remote Monitoring & Notification)**
- **Flexible threshold settings (Adjustable Safety Threshold)**

# Process of Creating the FLOWSAFE Project



Students develop the programming code for the system's working principles and physical aspects of the device, including the placement of the control system and sensors as data inputs.



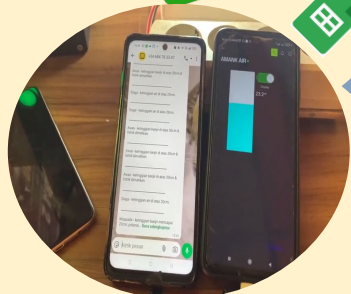
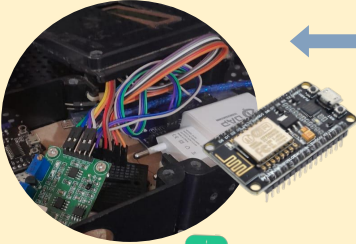
No	Date	Time	besip	status/entry
1	19/01/2026	16:26:36		
2	19/01/2026	16:26:36	25.91	Awas
3	19/01/2026	16:26:39	27.92	Awas
4	19/01/2026	16:26:14	33.39	Awas
5	19/01/2026	16:26:35	2.00	Awas
6	19/01/2026	16:26:44	29.34	Awas
7	19/01/2026	16:26:55	26.54	Awas
8	19/01/2026	16:40:24	0.00	Stop
9	19/01/2026	16:40:45	33.86	Awas
10	19/01/2026	16:40:51	34.65	Stop
11	19/01/2026	16:42:44	0.00	Waspada
12	19/01/2026	16:42:22	16.52	Waspada
13	19/01/2026	16:45:04	0.00	Waspada
14	19/01/2026	16:45:23	0.00	Awas
15	19/01/2026	16:47:12	0.00	Stop
16	19/01/2026	16:47:21	2.75	Waspada
17	19/01/2026	16:47:32	0.00	Waspada
18	19/01/2026	16:47:41	0.00	Waspada
19	19/01/2026	16:47:52	27.48	Awas
20	19/01/2026	16:48:34	16.99	Waspada
21	19/01/2026	16:48:53	16.99	Waspada
22	19/01/2026	16:49:41	27.66	Awas
23	19/01/2026	16:50:22	0.00	Awas
24	20/01/2026	12:08:11	0.00	Awas
25	20/01/2026	12:08:21	16.14	Awas

Water level measurements can be monitored through the Blynk application, Google Sheets, and the user's WhatsApp application.

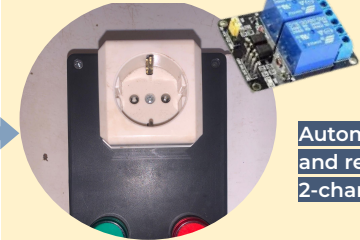
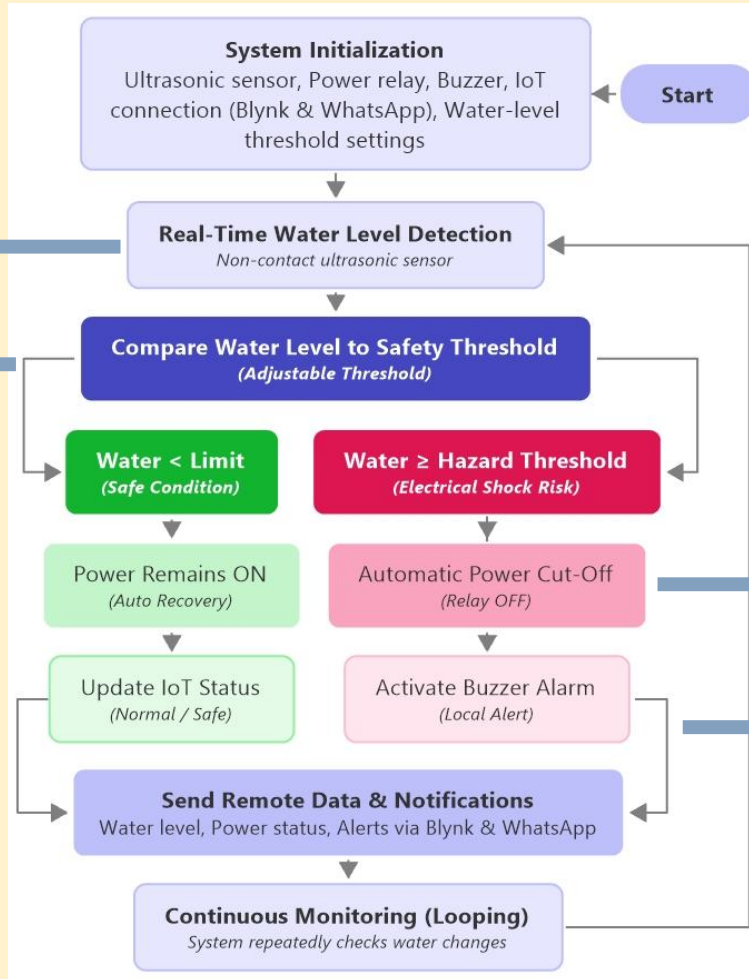
Water level detection using the HC-SR04 ultrasonic sensor.



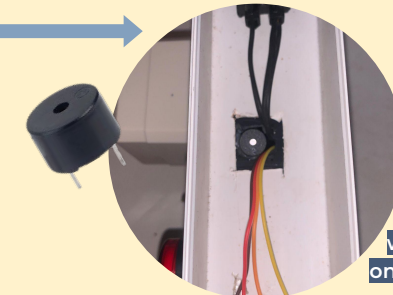
Process the input results and Adjustable Safety Threshold using NodeMCU ESP8266



Real-time data monitoring through WhatsApp, Blynk, and Spreadsheets

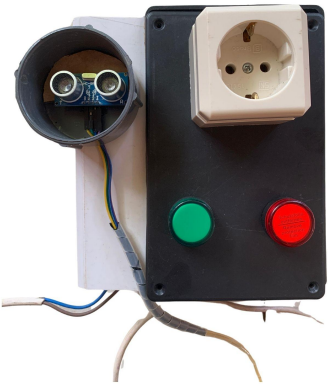


Automatic power cut-off and recovery using 2-channel relay



Local alarms with buzzer for on-site warnings

# Wiring Control



**Power plug**  
The connector used to plug a device into Flowsafe

**Electrical outlet box**  
Path to the main electrical load



**Pivot Lamp**  
Indicates whether the device has cut off the power or not

Tusuk kontak

Terminal

Kotak Kontak

Pilot Lamp

HC-SR04

Sensor Ultrasonik HC-SR04

Function for automatically detecting water levels during floods



NodeMCU



Buzzer



Relay 2 Channel



Buzzer

**Relay 2 Channel**  
Function to automatically disconnect the power supply when the water level exceeds the safe limit.

Automatic warning system for water level during floods

# Documentation of FLOWSAFE Implementation

Activities carried out by students include:

- Placement of the ultrasonic sensor
- Data monitoring via the Accurate LCD
- Data monitoring via Blynk
- Data monitoring via WhatsApp
- Data monitoring via Google Sheets

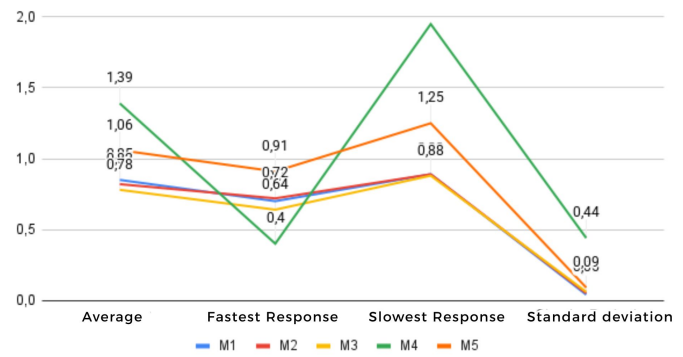


Implementation of FLOWSAFE at one of the residents' houses and at a river location in Balangan

The activity concluded with a group photo session and an emphasis on the importance of preventing electrical risks caused by flooding

# Data Results Accuracy Test of the FLOWSAFE

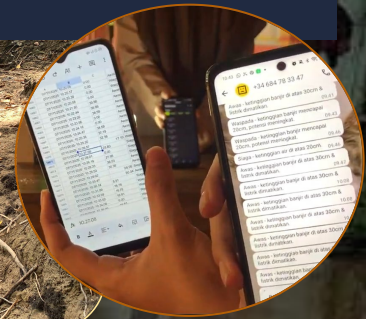
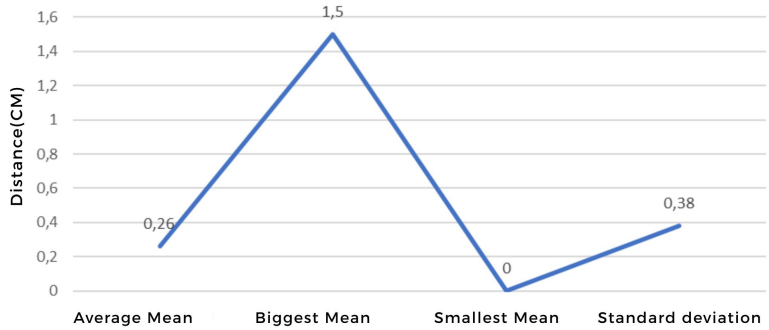
**Device Responsiveness Test**



**Conclusion**

**FLOWSAFE works quickly and accurately with an average standard deviation of 0.38. FLOWSAFE is expected to serve as an effective protection tool during floods by providing early warnings while also preventing electrical short-circuit hazards that could threaten lives and damage equipment.**

**Device accuracy test**



**Several residents reported that this device was helpful because it effectively addressed electrical problems during floods.**

# All Implementation Team Members



