Urine Detector System

Automated Liquid Detection System for Healthcare Facilities and Bedwetting Solutions
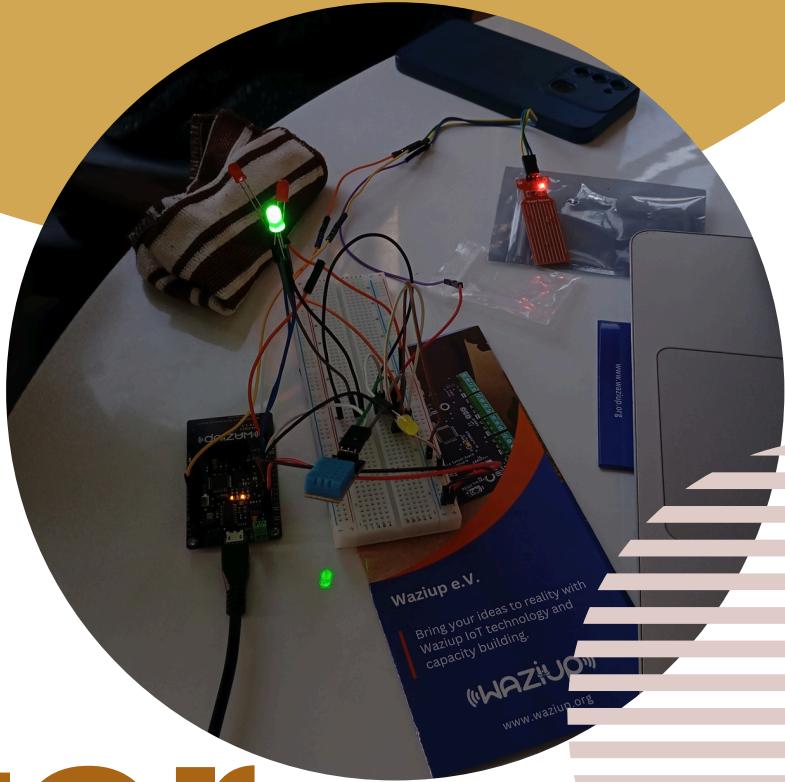
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Project
Background

Bedwetting is a common issue in nursing homes and child care units, leading to discomfort and potential health risks for individuals.
To address this problem, we developed an Automated Liquid Detection System using moisture and humidity sensors.
The system provides real-time monitoring and alerting for caregivers, ensuring timely response and enhanced patient care.

Project
Statement

Bedwetting incidents pose challenges in healthcare facilities and child care units, affecting the well-being and hygiene of individuals. Manual monitoring is time-consuming and may lead to delayed responses. The need for an automated solution that can promptly detect liquid and alert caregivers is crucial for maintaining a clean and comfortable environment.

Overall, a well-written project summary can help stakeholders understand the project's significance and potential impact.

Table of
Objectives

01 Develop an Automated Liquid Detection System using moisture and humidity sensors.

02 Implement a real-time monitoring system with three detection levels: Normal, Start (initial moisture detection), and Urinated.

03 Design a model system using cost-effective components, making it applicable for nursing homes, child care units, and beds for bedwetters.

04 Provide a scalable and adaptable solution that can be integrated into existing healthcare infrastructure.

05 IImplement a cloud database that will hold relevant data. This can be used in machine Learning and AI to make predictions and relevant

Project
Components

01 moisture sensor

02 WiFi module ESP12S

03 Firebase for cloud storage

04 power supply, jumper wires

05 Arduino IDE with libraries installed

Project
Scope

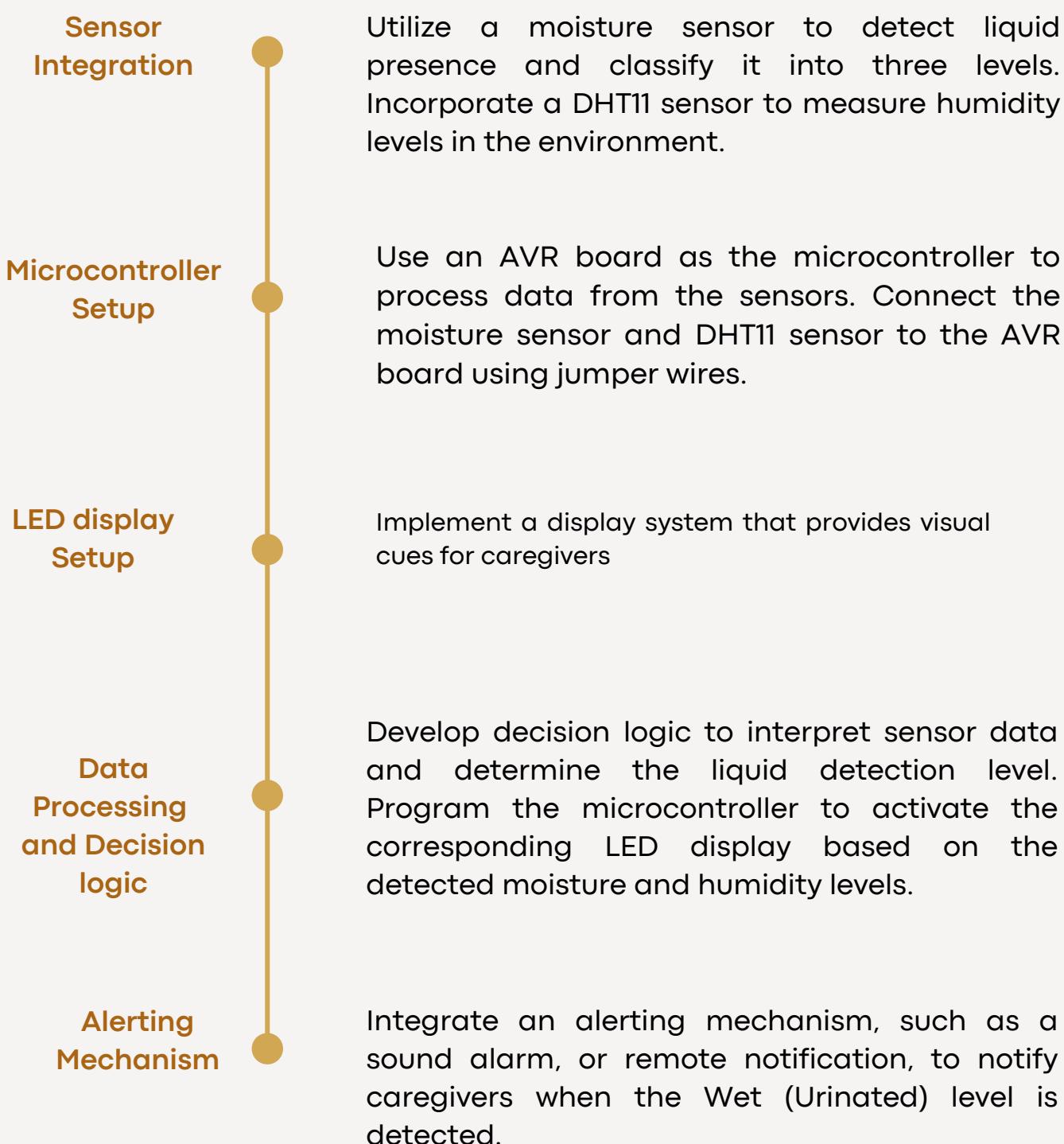The project scope includes designing the moisture detection sensor, integrating it with wireless communication, and creating an email notification system. It excludes more advanced features like integrating AI for urine analysis.

Success
Createria

Success is defined by the system being able to detect moisture accurately 95% of the time and sending an alert within 5 seconds to the mobile email.

Project
Methodology

Sensor Integration

Utilize a moisture sensor to detect liquid presence and classify it into three levels. Incorporate a DHT11 sensor to measure humidity levels in the environment.

Microcontroller Setup

Use an AVR board as the microcontroller to process data from the sensors. Connect the moisture sensor and DHT11 sensor to the AVR board using jumper wires.

LED display Setup

Implement a display system that provides visual cues for caregivers

Data Processing and Decision logic

Develop decision logic to interpret sensor data and determine the liquid detection level. Program the microcontroller to activate the corresponding LED display based on the detected moisture and humidity levels.

Alerting Mechanism

Integrate an alerting mechanism, such as a sound alarm, or remote notification, to notify caregivers when the Wet (Urinated) level is detected.

Target
Audience

01 Healthcare Providers and Facilities

- Hospitals and Clinics: Urine detector systems could help in monitoring patients, especially those with urinary incontinence, kidney problems, or other conditions that require regular urine output tracking.

- Nursing Homes and Assisted Living Facilities: Elderly patients, especially those with mobility issues or incontinence, may need monitoring to prevent accidents and improve care.

- Home Healthcare Providers: Caregivers managing patients with urinary issues at home could use such systems for easy monitoring.

02 Caregivers and Family Members

- Parents of Infants or Toddlers: Systems integrated into diapers can help parents monitor their babies' urinary habits without constantly checking diapers.

- Caregivers for the Elderly or Disabled: Caregivers looking after people who have limited mobility or cognitive impairments could benefit from a system that helps them detect urinary accidents.

Risks, Challenges **&**
Solutions

01 Challenges

Sensor Accuracy: Initial testing showed inconsistencies in moisture detection, which were resolved by choosing a more sensitive capacitive sensor

Limited battery life in the sensor unit

02 Risks

- limited battery life in the sensor unit, so a backup plan might involve optimizing the power consumption or including a low-power mode

- sensor failure or inaccuracy in detecting moisture, leading to the need for backup sensors or additional testing, which could extend the timeline and increase costs

Key

Achievements

01 Functional Implementations

The system accurately detects moisture and promptly sends a notification via the mobile app, meeting the project's performance goals of 95% detection accuracy and a response time of less than 10 seconds.

02 User-Friendly Design

The web application offers a simple interface, making it easy for caregivers and parents to receive notifications and track the sensor status

03 Low-Power Operation

The sensor operates efficiently, extending battery life to more than three months, thus minimizing the need for frequent replacements.

Future Advancements and

Emergency Response Applications

01 Real-time Health Monitoring

02 Predictive Analytics

03 Automated Emergency Alerts

04 Integration with Smart Home Systems

05 Remote Diagnostics

06 GPS Tracking

Conclusion

The Urine Detector System represents a significant innovation in healthcare technology, with potential applications in both institutional and home care settings.

Its alignment with primary healthcare and digital technology showcases the practical application of academic research in solving real-world problems.

As the project scales and incorporates future advancements, it has the potential to revolutionize patient care and emergency response capabilities.

Our
Team

SOLOMON KANIARU
solomonkaniaru154@gmail.com

JAMES MAINA
jemo7157@gmail.com

LYDIA NYAMU
nyamulydia43@gmail.com

TITUS MAINA
titusmainakamau053@gmail.com

MICK ALVIN
mickalvin31@gmail.com

IAN MALON

SAMUEL NJUGO
SUPERVISOR

DR RATEMO MAKIYA
SUPERVISOR

MR HARUN KAMAU
SUPERVISOR