





**INVENTOR**  
**FACULTY**  
**UNIVERSITY**  
**EMAIL**  
**CO-INVENTORS**

: TS DR NURUL NADRAH AQILAH BINTI TUKIMAT

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: WAN ZUNARAH BT OTHMAN, WAN AMRUL SYAHBI BIN WAN MAZLAN,  
DR ABDUL SYUKOR BIN ABD RAZAK, TS DR NURFARHAYU BT ARIFFIN,  
And DR MUHAMMAD @S.A KHUSHREN SULAIMAN

**Patent**  
• IP Pending

TRL: 7  
GRANT NO: RDU220338 (RM27,000)

### Product Background

More than  
30 of  
consecutive  
missing days  
on existing  
water level  
stations

Lack of water  
level station  
installed on  
site

Uncertainty in  
the climate  
changes causes  
large changes  
to the  
streamflow  
pattern

Requires  
complex  
hydraulics and  
hydrological  
data for flood  
forecasting

### Product Features

- WALES SIMULATOR is a valuable software to estimate river water level (WL) depends on meteorological variables such as rainfall and evaporation.
- The portable software that can be used to track current WL using real-time data.

### Industrial Benefit

- River WL forecasting as indicator for the flood monitoring
- Potential to estimate the WL at un-gauged area

### Marketability

Price: RM15,000  
(Software + Training + WL Projection)  
(The package only for particular state)

### Collaborators

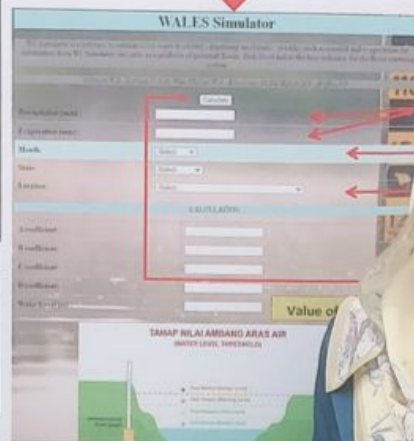


### Achievement

Gold Medal in CITREX2023

[www.ump.edu.my](http://www.ump.edu.my)

### Solution



### Results



SOFTWARE	Year	Rank	Score
WALES SIMULATOR	2023	1	95%
WALES SIMULATOR	2022	1	95%
WALES SIMULATOR	2021	1	95%



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[General](#)

## **Ts. Dr. Nurul Nadrah Aqilah created software to predict river water levels to identify flood areas**

4 March 2024

PEKAN, 1 January 2024 – Difficulty in analysing water level data which is important data for identifying flood areas sparked an idea to a researcher and lecturer of the Faculty of Civil Engineering Technology (FTKA), Ts. Dr. Nurul Nadrah Aqilah Tukimat, 38 to create WALES Simulator, a software that can predict river water levels based on meteorological variables such as rain and evaporation.

In identifying parameters and producing long-term water level equations, this research was conducted with Universiti Tun Hussein Onn Malaysia (UTHM) lecturer, Associate Professor Dr. Siti Nazahiyah Rahmat and two master students, Wan Zunairah Othman and Wan Amirul Syahmi Wan Mazlan.

In addition, several FTKA lecturers, Associate Professor Dr. Abdul Syukor Abd. Razak, Dr. Nur Farhayu Ariffin and Dr. Muhammad Khusyren Sulaiman also contributed ideas regarding this software.

According to Ts. Dr. Nurul Nadrah Aqilah, in current practice, water level stations are located in certain locations to detect changes in river water levels (WL).

“Information from WL is the best indicator for flood warning systems and forecasts of potential floods, flash floods and droughts.





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### Solution



- Enter rainfall & evaporation
- Choose month
- Choose state and location
- Click Calculate button

### Novelty

- The WL is calculated based on multilinear regression equation
- The variables considered are rainfall, evaporation, and 4 coefficients (A, B, C, and D)
- The performances of simulated WL show a good result with >90% accuracy

### Benefit of Product

- WALES SIMULATOR is a future water level estimator using hydrological data only.
- It is the best indicator to monitor the increment/decrement of WL based on real time data.
- It is also very useful software to determine the WL at un-gauged area and for the long-term forecasting.

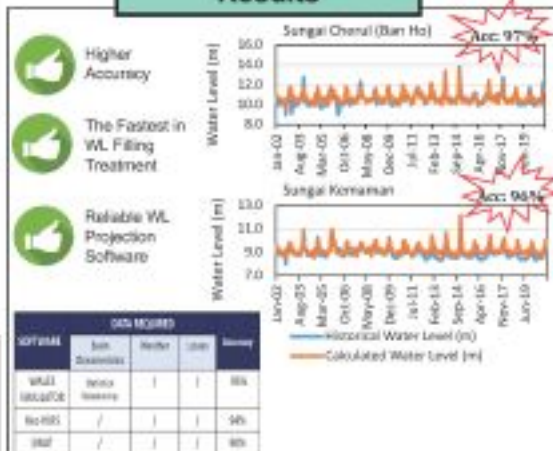
### Status of Innovation

TRL Level 7 – The product has been demonstrated in relevant industries. The LOI has been signed between NAHRIM and UMP

### Publications

- 1) Nurul, N.A., Nadrah, N.N., and Wan, S. (2021) Estimation of the Potential Trend Changes on the Streamflow with Climate Responder Consideration, IOP Conference Series: Earth and Environmental Science, 882(1): 012044
- 2) Othman, W.Z., Tukimat, N.H.A., Nurul, N.A., Nadrah, N.N., and Wan, S. (2022) Analysis of Climate Variability and Trends in the Context of Climate Change: Case Study in Temengghu, UEM, 1495, 68-07, 600916
- 3) Othman, W.Z., and Tukimat, N.H.A. (2023) Spatial Relationship of Water Level in Kemaman River Basin, submitted to WIS, indexed by Scisearch

### Results



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estimating the effects of climate change.

“Furthermore, the problem of missing data on existing WL stations due to network miscommunication also leads to biased results in hydrological modelling work,” she said.

Therefore, she said WALES Simulator is the best software to solve the problem of filling in the missing WL, estimating the WL especially in uncontrolled areas and predicting the long-term changes of the WL.

The research, which began in 2021, was also collaborated by the National Water Research Institute of Malaysia (NAHRIM), which is one of the agencies that will adopt the software.

She explained that users can use this software by entering the amount of rainfall and evaporation per month including entering the information month and location and then the calculation section will perform calculations to estimate water levels.

For now, the price of the software is for one state only with a minimum cost of at least RM15,000 which includes the software, training and user guide.

However, the price changes depending on the location and number of stations required.

She also intends to expand the use of WALES Simulator to the relevant government agencies such as the Department of Irrigation and Drainage (DID), Tenaga Nasional Berhad (TNB) and others.

Previously, she created IIUVIA Converter – The Rainfall Solution software.

This product bagged a gold medal in the 2022 Creation, Innovation, Technology & Research Exposition (CITREx).

The research also won a gold medal at the International Invention, Innovation and Technology Exhibition (ITEX) 2023 which took place at the Kuala Lumpur Convention Centre (KLCC) on 11 and 12 May 2023.

**By: Nur Hartini Mohd Hatta, Centre For Corporate Communications**

**Translation By: Dr. Rozaimi Abu Samah, Faculty Of Chemical And Process Engineering Technology**

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