



INVENTOR : TS DR NURUL NADRAH AQILAH BINTI TUKIMAT

FACULTY : FACULTY OF CIVIL ENGINEERING TECHNOLOGY
UNIVERSITY : UNIVERSITI MALAYSIA PAHANG

EMAIL : nadrah@ump.edu.my
CO-INVENTORS : 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

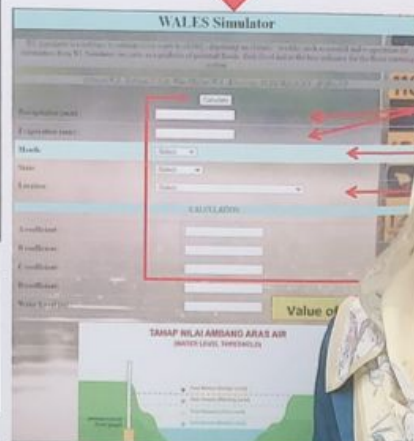


Achievement

Gold Medal in CITREX2023

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Solution



Results



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



[Research](#)

Ts. Dr. Nurul Nadrah Aqilah cipta perisian meramal paras air sungai bagi mengenal pasti kawasan banjir

27 December 2023

PEKAN, 26 Disember 2023 – Kesukaran menganalisis data paras air yang merupakan data penting bagi mengenal pasti kawasan banjir mencetuskan idea kepada seorang penyelidik dan pensyarah Fakulti Teknologi Kejuruteraan Awam (FTKA), Ts. Dr. Nurul Nadrah Aqilah Tukimat, 38 untuk menghasilkan *WALES Simulator*, perisian yang dapat meramal paras air sungai berdasarkan pemboleh ubah meteorologi seperti hujan dan sejatan.

Dalam mengenal pasti parameter dan menghasilkan persamaan paras air jangka panjang, penyelidikan ini telah dijalankan bersama pensyarah Universiti Tun Hussein Onn Malaysia (UTHM), Profesor Madya Dr. Siti Nazahiyah Rahmat dan dua orang pelajar sarjana iaitu Wan Zunairah Othman dan Wan Amirul Syahmi Wan Mazlan.

Selain itu, beberapa orang pensyarah FTKA, Profesor Madya Dr. Abdul Syukor Abd. Razak, Dr. Nur Farhayu Ariffin dan Dr. Muhammad Khusyren Sulaiman turut menyumbangkan idea berkenaan perisian ini.



اوتيزرستكي مليسيا قهق
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- 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.

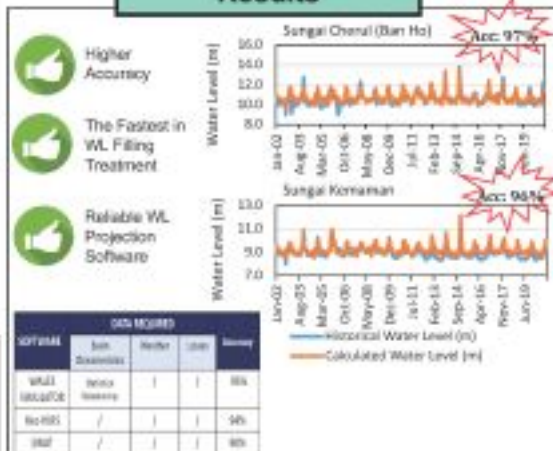
Status of Innovation

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

Publications

- 1) Nurul, N.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.N.A., Nurul, N.N.A., Nadrah, N.N. and Wan, S. (2022) Analysis of Climate Variability and Trends in the Context of Climate Change: Case Study in Temenggam, UEM, 1495, 68-07, 600916
- 3) Othman, W.Z., and Tukimat, N.N.A. (2023) Spatial Relationship of Water Level in Kemuning River Basin, submitted to WJST, indexed by Scopus

Results



Menurut Ts. Dr. Nurul Nadrah Aqilah, dalam amalan semasa, stesen paras air terletak di lokasi tertentu untuk mengesan perubahan paras air sungai (WL).

“Maklumat daripada WL adalah petunjuk terbaik untuk sistem amaran banjir dan ramalan potensi banjir, banjir kilat serta kemarau.

“Walau bagaimanapun, kekurangan stesen WL yang dipasang di tapak, terutamanya di lokasi yang terdedah kepada banjir, mewujudkan cabaran dan masalah dalam pemodelan hidrologi, terutamanya untuk pemantauan jangka panjang dan menganggar kesan perubahan iklim.

“Tambahan pula, masalah data yang hilang pada stesen WL sedia ada disebabkan oleh salah komunikasi rangkaian juga membawa kepada keputusan berat sebelah dalam kerja pemodelan hidrologi,” ujarnya.

Oleh itu, katanya *WALES Simulator* ialah perisian terbaik untuk menyelesaikan masalah mengisi WL yang hilang, menganggarkan WL terutamanya di kawasan yang tidak dikawal dan meramalkan perubahan jangka panjang WL.

Penyelidikan yang bermula pada tahun 2021 itu turut mendapat kerjasama daripada Institut Penyelidikan Air Kebangsaan Malaysia (NAHRIM) yang merupakan salah satu agensi yang akan mengguna pakai aplikasi tersebut.

Beliau menjelaskan, pengguna boleh menggunakan perisian ini dengan memasukkan jumlah curahan hujan dan penyejatan setiap bulan termasuklah memasukkan makluman bulan, lokasi dan seterusnya bahagian pengiraan akan melakukan pengiraan bagi menganggarkan paras air.

The image shows a screenshot of the 'WALES Simulator' software interface. The interface is divided into several sections. At the top, there is a title bar and a brief description of the simulator. Below this, there are input fields for 'Precipitation (mm)' and 'Evaporation (mm)', each with a 'Calculate' button. There are also dropdown menus for 'Month', 'State', and 'Location'. Below these, there is a 'CALCULATION' section with input fields for 'A coefficient', 'B coefficient', 'C coefficient', and 'D coefficient', and a 'Water Level (m)' field. At the bottom, there is a graph titled 'TAHAP NILAI AMBANG ARAS AIR (WATER LEVEL THRESHOLD)' showing a water level rising towards a threshold. To the right of the interface, there are four numbered annotations with red arrows pointing to specific parts of the interface: 1. 'Enter monthly rainfall and evaporation' points to the 'Precipitation' and 'Evaporation' input fields. 2. 'Choose month' points to the 'Month' dropdown menu. 3. 'Choose state and location' points to the 'State' and 'Location' dropdown menus. 4. 'Click Calculate button' points to the 'Calculate' button in the 'CALCULATION' section. A blue starburst graphic at the bottom right contains the text 'Estimated Water Level'.

Buat masa kini, harga perisian hanya untuk satu negeri sahaja dengan kos minimum sekurang-kurangnya RM15,000 yang merangkumi perisian, latihan dan manual.

Walau bagaimanapun, harga tersebut berubah tertakluk kepada lokasi dan bilangan stesen yang diperlukan.

Beliau juga berhasrat mahu meluaskan lagi penggunaan *WALES Simulator* kepada agensi-agensi kerajaan yang terlibat seperti Jabatan Pengairan dan Saliran (JPS), Tenaga Nasional Berhad (TNB) dan sebagainya.

Sebelum ini, beliau pernah menghasilkan perisian *IIVUA Converter – The Rainfall Solution*.

Produk ini telah merangkul pingat emas dalam Pertandingan Reka Cipta, Kreatif dan Inovasi (CITREX) 2023.

Pada Pameran Reka Cipta, Inovasi dan Teknologi Antarabangsa (ITEX) 2023 yang berlangsung di Kuala Lumpur Convention Centre (KLCC) pada 11 hingga 12 Mei 2023, penyelidikan ini turut meraih pingat emas.

Disediakan Oleh: Nur Hartini Mohd Hatta, Pusat Komunikasi Korporat

TAGS / KEYWORDS

[WALES Simulator](#)

[Fakulti Teknologi Kejuruteraan Awam](#)

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