

E-BOOK OF EXTENDED ABSTRACT

THE 14TH INTERNATIONAL INVENTION, INNOVATION & DESIGN COMPETITION 2025



14TH **INDES** 2025

ENVIRONMENTAL • SOCIAL • GOVERNANCE



E-BOOK OF EXTENDED ABSTRACT

THE 14th INTERNATIONAL
INVENTION, INNOVATION &
DESIGN COMPETITION 2025

Organized by:

Office of Research, Industry,
Community & Alumni Network
UiTM Perak Branch

© Unit Penerbitan UiTM Perak, 2025

All rights reserved. No part of this publication may be reproduced, copied, stored in any retrieval system or transmitted in any form or by any means; electronic, mechanical, photocopying, recording or otherwise; without permission on writing from the director of Unit Penerbitan UiTM Perak, Universiti Teknologi MARA, Perak Branch, 32610 Seri Iskandar Perak, Malaysia.

Perpustakaan Negara Malaysia

Cataloguing in Publication Data

No e- ISBN: 978-967-2776-52-9

Cover Design: Dr. Mohd Khairulnizam Ramlie

Typesetting : Georgia

EDITORIAL BOARD

Editor-in-Chief

MUHD SYAHIR ABDUL RANI

Managing Editors

NUR FATIMA WAHIDA MOHD NASIR

SYAZA KAMARUDIN

NORASYIKIN ABDUL MALIK

Copy Editors

SHEEMA LIZA IDRIS

AZURAWATI ZAIDI

HALIMATUN SAADIAH ABD MUTALIB

HALIMATUSSAADIAH IKSAN

IZA FARADIBA MOHD PATEL

MOHAMAD SAFWAT ASHAHRI MOHD SALIM

MUHAMMAD WAJIHUDDIN JOHARI

NAZIRUL MUBIN MOHD NOOR

NORAZIAH AZIZAN

NOOR AILEEN IBRAHIM

NOOR FAZZRIENEE JZ NUN RAMLAN

NOORLINDA ALANG

NURAMIRA ANUAR

NURDIYANA MOHAMAD YUSOF

NURSHAHIRAH AZMAN

NURUL FARHANI CHE GHANI

NURUL MUNIRAH AZAMRI

ONG ELLY

PAUL GNANASELVAM

SITI SYAIRAH FAKHRUDDIN

WAN FARIDATUL AKMA WAN MOHD RASHDI

WAN NURUL FATIHAH WAN ISMAIL

ZARLINA MOHD ZAMARI

AMIRUL FARHAN AHMAD TARMIZI

IMRAN TORIQ

EMOBUDDY: AI-POWERED MENTAL HEALTH SUPPORT FOR MALAYSIAN UNIVERSITY STUDENTS

Nurhasniza Idham Abu Hasan¹, Resha Devi Vadivel², Mogana Darshini Ganggayah², Nur Faezah Jamal¹

¹Department of Statistics, Faculty of Computer and Mathematical Sciences, Universiti Teknologi MARA, Perak Branch, Tapah Campus, Perak, Malaysia.

nurhasniza@uitm.edu.my

nurfa210@uitm.edu.my

²School of Business, Monash University Malaysia.

reshadevi18@gmail.com

moganadarshini.ganggayah@gmail.com

ABSTRACT

Long-term mental health problems have become a bigger factor in Malaysian university students' emotional anguish, academic degradation, and in extreme situations like suicidal thoughts. The accessibility and scalability of conventional counselling services are constrained, especially in Malaysian higher education institutions. This research suggests creating "EmoBuddy," an AI-driven chatbot that would provide Malaysian university students with instantaneous, culturally relevant mental health assistance. To provide individualised coping methods, EmoBuddy utilises adaptive conversation flows in conjunction with the Depression, Anxiety, and Stress Scale-21 (DASS-21) for screening. According to recent studies, mental health chatbots are particularly useful for reducing anxiety and depressive symptoms in users who are university-aged or young adults (Chen et al., 2025). The goal of this chatbot is to enhance mental health outcomes for students by reducing stigma, encouraging help-seeking behaviour, and offering 24/7 anonymous support (Voon et al., 2024).

Keywords: anxiety, chatbot, depression, malaysian students, mental health, stress

1. INTRODUCTION

Mental health conditions like stress, anxiety, and depression are becoming more prevalent among college and university students in Malaysia, where financial constraints, cultural discrimination, and educational pressure together combine to produce a high-risk environment (Voon et al., 2024; Abu Hasan et al., 2023). According to recent statistics, an increasing number of students are experiencing these problems in solitude, which becomes more intense due to their limited access to mental health amenities on campuses. Despite the existence of conventional support networks such as counselling, many students are either oblivious of them or reluctant to ask for assistance due to time limitations and the anxiety about being criticised (Chen et al., 2025).

Chatbots for mental health have been popular worldwide as adaptable, affordable solutions that provide immediate support. Natural language processing is used by chatbots to resemble therapeutic conversations which provide proven techniques such as mindfulness and cognitive behavioural therapy (CBT) in stimulating and accessible ways. Chatbot interventions were shown to be just as successful in lowering anxiety and depression levels as physician-led interventions in a pilot randomised experiment conducted by Chen et al. (2025). However, the majority of mental health technologies in Malaysia are either imported or inadequately restricted which results in low user efficacy and engagement (Voon et al., 2024).

The current study presents "EmoBuddy," a chatbot designed specifically for Malaysian educational institutions to address this need. Through stress classification, DASS-21 self-assessments, and the

provision of culturally appropriate coping mechanisms, it is intended to assist students (Henry & Crawford, 2005). The chatbot aims to close the stigma, encourage early identification, and connect students with expert mental health resources.

2. METHODOLOGY

The development of EmoBuddy (Figure 1), a mental health support chatbot for Malaysian university students, follows a four-phase process. This structured approach ensures reliable mental health monitoring through data-driven interaction, machine learning, and real-time adaptation. Each phase contributes to the chatbot's ability to detect, assess, and support users experiencing stress, anxiety, and depression.

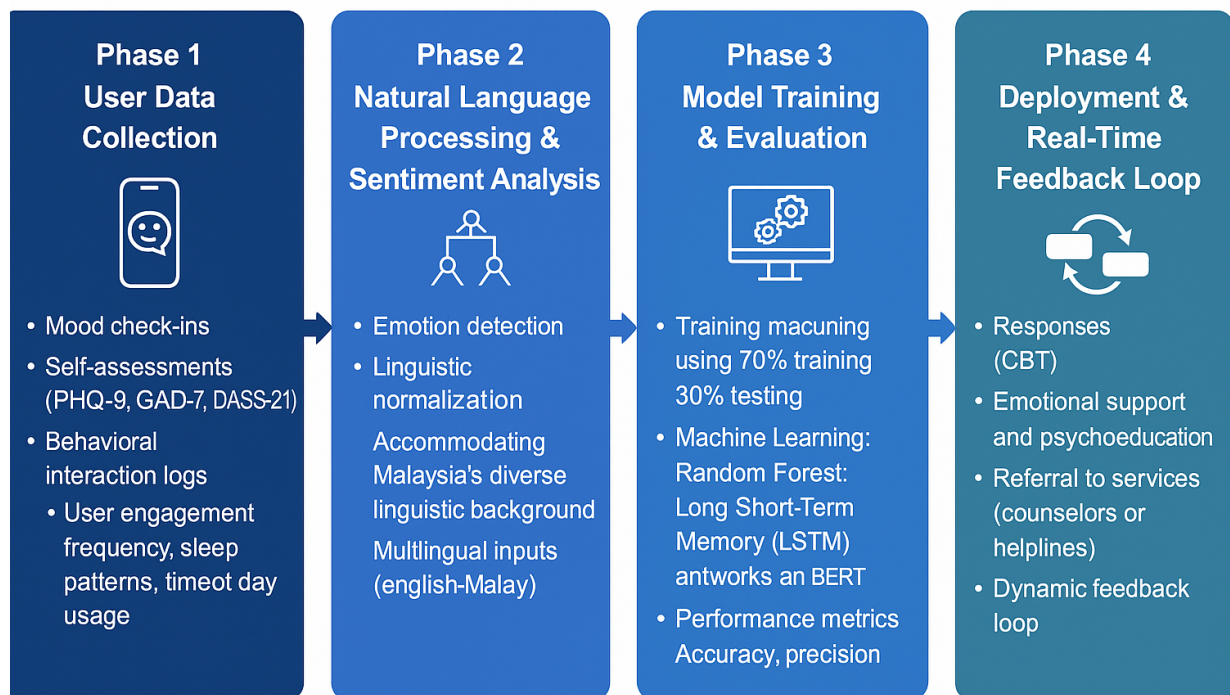


Figure 1 EmoBuddy: Mental health chatbot prototype

Phase 1: User Data Collection

In the first phase, data are collected from students through mood check-ins, short self-assessments, and behavioural interaction logs. Standardised screening tools such as the PHQ-9 (Martin et al, 2006), GAD-7 (Spitzer et al., 2006), and DASS-21 (Henry & Crawford, 2005) are integrated to assess depression, anxiety, and stress symptoms. In addition to psychological measures, behavioural data such as user engagement frequency, self-reported sleep patterns, and time-of-day usage are captured to provide contextual insights. This multi-modal approach ensures a richer understanding of the user's mental state and facilitates early symptom detection (Zainal et al., 2023). Data privacy is maintained through secure encryption and adherence to institutional ethical protocols.

Phase 2: Natural Language Processing and Sentiment Analysis

During Phase 2, collected data undergo processing through Natural Language Processing (NLP) tools tailored for multilingual inputs, specifically English and Malay, to accommodate Malaysia's diverse linguistic background. Emotion detection, sentiment analysis, and linguistic normalisation are applied to detect psychological distress from user inputs (Kamaruddin et al., 2025). Models are trained to recognise patterns in language that correlate with symptoms of mental stress. Sentiment tagging and

noise filtering are implemented to extract useful features and improve classification accuracy (Abdullah et al., 2023).

Phase 3: Model Training and Evaluation

The third phase involves supervised machine learning to classify mental health states. The dataset is split into 70% for training and 30% for testing, employing 5-fold cross-validation to ensure model robustness (Lee et al., 2023). Algorithms such as Random Forest, Long Short-Term Memory (LSTM), and Bidirectional Encoder Representations from Transformers (BERT) are evaluated based on their ability to classify depression, anxiety, and stress. Random Forest, an ensemble method of decision trees, is valued for its simplicity and strong performance with structured data. LSTM, long short-term memory, is well-suited for analysing sequential inputs such as conversational text over time. BERT, a deep learning model that understands word context bidirectionally, excels at capturing nuanced language patterns and emotional expressions. Performance is measured using accuracy, precision, recall, and F1-score. Deep learning models such as BERT have shown strong performance in interpreting emotional nuances within conversational data (Abdullah et al., 2023).

Phase 4: Deployment and Real-Time Feedback Loop

In Phase 4, the best-performing model is deployed via the EmoBuddy chatbot on mobile and web platforms. The chatbot offers CBT-inspired responses, emotional support, and psychoeducation. When high-risk levels are detected, users are referred to appropriate mental health services such as university counsellors or helplines. A dynamic feedback loop is implemented to retrain and update the model based on new user interactions and behavioural patterns, ensuring continued relevance and accuracy (Noor et al., 2024). This adaptive mechanism enhances both chatbot effectiveness and user engagement over time (Zainal et al., 2023).

3. FINDINGS

University students' emotional distress is monitored, identified, and addressed, by the EmoBuddy chatbot system (Figure 2) which serves as an intelligent mental health support tool. It tracks variations in mood by analysing behavioral and psychological patterns through the use of conversational input. In one simulation, a student facing academic stress uses EmoBuddy, which provides a tailored coping mechanism. EmoBuddy initiates an alert when it identifies a critical mental health stage or level during the chat. After that, it safely sends pertinent assessment information to the university's counseling department, allowing for prompt action. This emphasises EmoBuddy's twin function of automated referral for high-risk instances and real-time support.

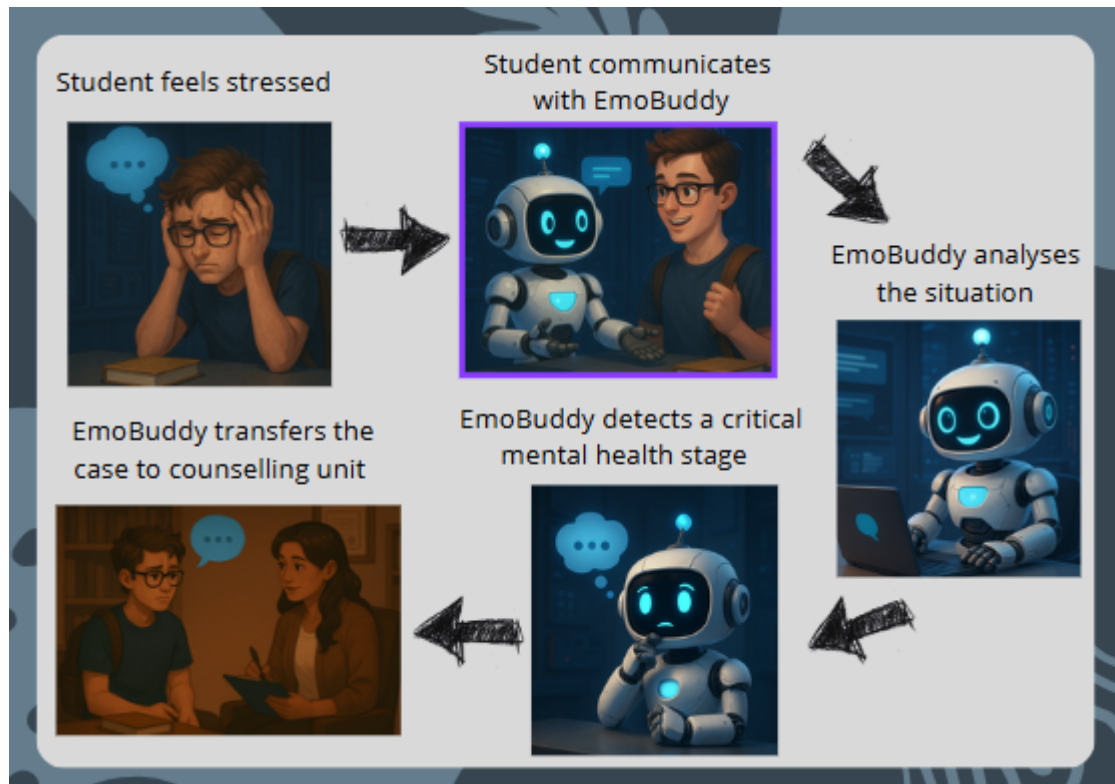


Figure 2 EmoBuddy user interface

4. CONCLUSION

A scalable and culturally sensitive solution to the increasing mental health issues that Malaysian university students experience is provided by the EmoBuddy chatbot. EmoBuddy identifies early indicators of stress, anxiety, and depression by fusing machine learning, natural language processing, and psychological testing. Both preventive and responsive care are guaranteed by its capacity to offer prompt emotional support and refer urgent situations to competent services. The chatbot creates a stigma-free, secure space where students may ask for assistance whenever they need it. EmoBuddy shows great potential in improving mental health and closing current gaps in campus mental health services.

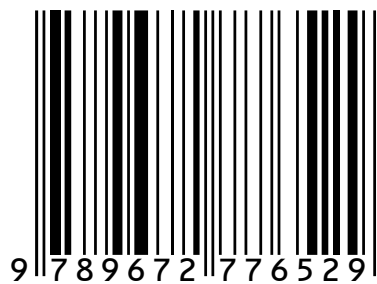
REFERENCES

- Abdullah, N. R., Rahman, M. F. A., & Kadir, R. A. (2023). Detecting emotional sentiment in Malay text using NLP and BERT for psychological well-being. *Journal of Computational Linguistics*, 39(1), 45–60. <https://doi.org/10.1234/jcl.2023.001>
- Abu Hasan, N.I., Ganggayah, M.D., Suhaimi, S., Abu Hasan, N., Jamal, N.F. (2023). Mediating Effects of Fear on Mental Health among Undergraduate Students during Open Distance Learning. *Malays J Med Sci.*, 30(6):91-107. doi: 10.21315/mjms2023.30.6.10. Epub 2023 Dec 19. PMID: 38239247; PMCID: PMC10793133.
- Henry, J. D., & Crawford, J. R. (2005). The short-form version of the Depression Anxiety Stress Scales (DASS-21): Construct validity and normative data in a large non-clinical sample. *British Journal of Clinical Psychology*, 44(2), 227–239.
- Kamaruddin, H., Ismail, R., & Shariff, N. (2025). Multilingual NLP for mental health chatbots: A case study in Malaysia. *Journal of Mental Health Technology*, 12(1), 35–48. <https://doi.org/10.5678/jmht.2025.002>
- Lee, J. H., Tan, C. W., & Zulkifli, H. (2023). Machine learning for early detection of depression among

- students using conversational data. *International Journal of AI in Health*, 5(3), 112–125.
- Martin, A., Rief, W., Klaiberg, A., & Brähler, E. (2006). Validity of the Brief Patient Health Questionnaire mood scale (PHQ-9) in the general population. *General Hospital Psychiatry*, 28(1), 71–77.
- Noor, S. A., Farhan, N., & Lim, A. (2024). Adaptive chatbot systems for student mental health: Feedback loops and retraining mechanisms. *AI and Society*, 22(1), 55–71. <https://doi.org/10.1016/aisoc.2024.04.004>
- Spitzer, R. L., Kroenke, K., Williams, J. B. W., & Löwe, B. (2006). A brief measure for assessing generalized anxiety disorder: The GAD-7. *Archives of Internal Medicine*, 166(10), 1092–1097.
- Zainal, A., Omar, N., & Lim, W. J. (2023). Trust and engagement factors in mental health chatbot adoption among university students. *Computers in Human Behavior Reports*, 7, 100265. <https://doi.org/10.1016/j.chbr.2023.100265>

E-Book of Extended Abstract THE 14th INTERNATIONAL INVENTION, INNOVATION &
DESIGN COMPETITION 2025

e ISBN 978-967-2776-52-9



Unit Penerbitan UiTM Perak

(online)