ABSTRACT

Throughout 2023, 1.16 million hectares of forest and land were burned, contributing182.7 megatons of CO2 emissions. The smoke from forest and land fires causes ARI disease in the community. Forest and land fires on peatlands also spread underground. This type of fire is difficult to detect and lasts a long time. The use of remote sensing technology through satellites to monitor forest and land fires continues. Through the SIPONGI application and the ranks of Manggala Agni officers, forest and land fires are trying to be overcome. Artificial intelligence is also used to predict the direction of fire spread. However, satellite technology and AI have not been able to detect underground fires. The author's research in the form of innovation ROBOT GAMBUT Robotic Network for Early Warning and Suppression of Peatland Underground Fires with LoRa (*Long Range*) Transmission and Artificial Intelligence Assisted Fire Spread Prediction tries to answer this challenge. The tubular robot is planted in peatland to directly detect underground fires through heat and soil moisture sensors. Data is sent via LoRa transmission to a data receiving center and uploaded to the internet via the *cloud*. With an android application, the Peat Robot is able to provide a distress alarm. Data is sent every 20 seconds for 24 hours. Gemini AI is utilized to provide predictions of fire distribution. This robot has the ability to extinguish the initial fire and is connected to a relay to turn on the water pump. The results showed that the control system test was 100% successful in 12 trials with the best response time of 21 seconds. LoRa transmission can reach 740 meters with a response time of under 30 seconds. ROBOT GAMBUT has been tested in West Kalimantan with 90% success. The Directorate of PKHL of the Ministry of Environment and Forestry recommended ROBOT GAMBUT for further *experimental farm* tests in Riau peatlands.

Keywords: Robot, Karhutla, Peat, LoRa, Artificial Intelligence (AI)