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CYBER PHYSICAL SYSTEM BASED RIVER WATER LEVEL MONITORING AND PREDICTION SYSTEM USING NAIVE BAYES

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Abstract:
This study is designed to develop and deploy an advanced Cyber Physical System (CPS) for forecasting and real-time monitoring of river water levels. It is intended to mitigate flood risk management challenges and provide effective early warnings to authorities and the public. The physical component of this system includes various crucial sensor, e.g. water level sensors to observe the surface level of rivers and rain sensor for observing the amount of rainfall. The sensed data of these sensors are processed locally by a microcontroller and then uploaded to a cloud platform. The cyber component of the CPS in this case is critical for data analysis with the assistance of the Naïve Bayes algorithm. Naïve Bayes algorithm has been employed as it can classify data effectively and forecast future status based on past data. The system categorizes water level status into five classes Safe, Alert 3, Alert 2, Alert 1, and Dangerous. Classification enables the system to provide accurate and structured alerts, which are critical for an immediate response. Test results show that the integration of the CPS with Naïve Bayes prediction model is highly effective. The system was found to have a very high rate of predicting with accuracy at 90%, meaning it can accurately predict water level status. Data accuracy in transmission from sensors to the processing system was 80-90%, meaning the employed hardware was trustworthy. Overall, it is possible for this research to confirm that the CPS model with the assistance of Naïve Bayes algorithm is a stable and consistent solution to river water level measurement and predictions, and providing a useful contribution to flood disaster prevention operations.

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