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(71)Name of Applicant :
1)TATIKONDA KRISHNA CHAITNYA
 Address of Applicant :D.NO:10-13-1, JAKKAVARI STREET, -----

2)Macharla Madhavi
3)Dasari Swetha
4)Suneel Miriyala
5)Painam Surendra Kumar
6)K. Sambasiva Rao
7)P.P.M. Prasad
 Name of Applicant : NA
 Address of Applicant : NA

(72)Name of Inventor :
1)TATIKONDA KRISHNA CHAITNYA
 Address of Applicant :D.NO:10-13-1, JAKKAVARI STREET, -----
2)Macharla Madhavi
 Address of Applicant :Department Of Ece, Bapatla Engineering College, Mahatmaji Puram, Bapatla -----
3)Dasari Swetha
 Address of Applicant :Department Of Ece, Bapatla Engineering College, Mahatmaji Puram, Bapatla -----
4)Suneel Miriyala
 Address of Applicant :Department Of Ece, Bapatla Engineering College, Mahatmaji Puram, Bapatla -----
5)Painam Surendra Kumar
 Address of Applicant :Department Of Ece, Bapatla Engineering College, Mahatmaji Puram, Bapatla -----
6)K. Sambasiva Rao
 Address of Applicant :Department Of Ece, Bapatla Engineering College, Mahatmaji Puram, Bapatla -----
7)P.P.M. Prasad
 Address of Applicant :Department Of Ece, Bapatla Engineering College, Mahatmaji Puram, Bapatla -----

(57) Abstract :
 Bridge Structural health monitoring systems are essential to bridge safety and integrity since they supply real-time data about the bridge's health, through the supply of real-time data about the health of the bridges. They consist of various sensors and technologies to track factors such as displacement, strain, vibration, and temperature, ultimately enhancing the body of knowledge concerning the health condition of a bridge over time. Detection of cracks, which is one of the most essential tasks of bridge health monitoring, utilises advanced techniques such as acoustic emission sensors using machine learning algorithms such as Support Vector Machines (SVM), Random Forest, and K-Means clustering to identify surface as well as internal cracking concerning a bridge's service load as well as lifespan. Among these methods, SVM is more accurate compared to the rest and therefore the best of the methods at monitoring structural cracking. Using machine learning and artificial intelligence in supporting the above systems enhances their ability to keep monitoring cracks as well as respond quicker, which is required for automated analysis as well as early warning systems. This invention summarises the importance of Bridge health monitoring systems, how they benefit bridge maintenance procedures, and the development of advanced crack detection techniques. All of which contribute to enhancing bridge infrastructure safety and lifetime.

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