KARNATAKA STATE COUNCIL FOR SCIENCE AND TECHNOLOGY

Indian Institute of Science campus, Bengaluru

Telephone: 080 -23600978, 23341652 || Email: spp@kscst.org.in
Website: www.kscst.org.in/spp.html or https://kscst.karnataka.gov.in/en

FORMAT FOR STUDENT PROJECT PROPOSAL FOR THE 47th SERIES OF STUDENT PROJECT PROGRAMME

(Handwritten proposals will not be accepted, please fill all the details in this MS word file, insert images / diagrams wherever necessary. Convert to pdf file, get it approved from the project guide / head of the department and principal of your institution. Keep ready the scanned pdf file of 1) Declaration and Endorsement 2) details of processing fees made and fill-up the Google Form.

https://forms.gle/mE8Q4pM2nwZQuHbi9

1.	**Name of the College:** Biluru Gurubasava Mahaswamiji Institute of Technology, Mudhol
2.	**Project Title:** Crowd Prediction for Bus lines using Artificial Intelligence
3.	**Branch:** Computer Science and Engineering
4.	**Theme (as per KSCST poster):** **(The project proposals shall mandatorily be from one of the broad themes / areas. Visit website www.kscst.org.in/spp.html)** 5. Big Data, integrating Internet of Things, Artificial Intelligence and Data Engineering (agriculture, health, education, digital literacy)
6.	**Name(s) of project guide(s):** 1. Name: Prof. Varun P. Sarvade Email id: varunpsarvade@gmail.com Contact No.: 8277169183 2. Name: Prof. Vinayak A. Telsang Email id: v.telsang@gmail.com Contact No.: 9620152576
7.	**Name of Team Members (Strictly not more than four students in a batch):** *(Type names in Capital Letters as provided in your college)* (Please paste the latest passport size photograph adjacent to your respective names)  Name: GOPAL R. CHENNI USN No.: 2LB20CS005 Email id: gc700892@gmail.com Mobile No.: 8073041564

	Name: PRADNYA S. BILAGI USN No.: 2LB20CS015 Email id: pradnyabilagi18@gmail.com Mobile No.: 7483364813  Name: DHANUSH J. YADAV USN No.: 2LB20CS003 Email id: danukumaryadav@gmail.com Mobile No: 7090491076  Name: NIRANJAN S. PURAD USN No.: 2LB20CS013 Email id: niranjanpuradkcs@gmail.com Mobile No.: 6366691520 
8.	**Team Leader of the Project:** Name: GOPAL R. CHENNI USN No.: 2LB20CS005 Email id: gc700892@gmail.com Mobile No.: 8073041564
9.	**Processing Fee Details (Through Online Payment only):** **(processing fee of Rs. 1000/-)** **Please furnish the payment details in the format provided in the last page of the proposal.**
10.	**Date of commencement of the Project:** 22/12/2023
11.	**Probable date of completion of the project:** 15/06/2024
12.	**Scope / Objectives of the project:** • The main purpose of this project is to reduce accidents due to overcrowding . • Reduce bus waiting period for passengers and also to reduce operational cost for public transport companies. • Predicting the number of passengers on bus line for public transport companies like a KSRTC. • RNN Model will be trained based on historical data of public transport companies. • Provide helping tool for controller/s of the bus stand for crowed management especially

during local events, holidays or festival season.

13. **Methodology:**

KSRTC(Karnataka State Road Transport Corporation) is one of the largest public transport corporations in India. As per KSRTC data for the month of December 2020, 12.93 lakh passengers travel per day and 40% buses have incurred miner and major accidents in the same month, and also KSRTC reported 2000 litters of fuel wastage per 2 to 4 kms. Crowd prediction for bus lines utilizing artificial intelligence is a groundbreaking application that harnesses AI algorithms and data analytics to forecast and manage passenger loads and bus capacities. By amalgamating historical data, real-time information, and machine learning models, this technology aims to revolutionize the public transportation sector. Through predictive analysis, AI algorithms can anticipate and project the volume of passengers at various bus stops or along specific routes at different times of the day. Factors such as historical ridership patterns, weather conditions, special events, and even social trends are considered to create accurate forecasts. The primary objective is to optimize bus services by efficiently allocating resources, adjusting schedules, and enhancing passenger experience. By anticipating crowdedness, transportation authorities can implement strategies like deploying additional buses, altering routes, or regulating frequencies to mitigate overcrowding and improve overall efficiency

Figure 1: Flow Chart

Algorithm

Input: Bus routine Database

Output: Bus crowd prediction

Step 01: Pre-Processing of data sheet

Step 02: Training and Testing the RNN Model

A. If Training is successful go to next step
   Else go to first step

B. If Testing is successful go to direct Prediction model
   Else go to first step

Step 03: Apply regression machine learning algorithm

Step 04: Evaluation

Step 05: Display results.

Public transport is a key element to ensure urban mobility and allow citizens to move easily and efficiently in urban areas. However, managing the influx of passengers in public transport is a daily challenge for transport companies. In this context, predicting the number of passengers on bus lines is essential to optimize the planning, management and organization of the public transport service. In this project, we propose a methodology to predict the number of passengers on bus lines for the next 3 days.

Here we have to use three types of data sets, namely

1. Climate Data Set
2. Event Data Set
3. Holiday/Festival Data Set

After collecting the data to compare, the next step is to load and pre-process the data, to ensure that it is in the correct format and that it was clean and error-free. The following steps will be used for preprocessing:

- Data cleaning: Removal of missing values, duplicates and correction of errors.
- Feature scaling: Rescale the data so that each feature has a similar scale. Common scaling techniques include min-max scaling, standardization, and normalization.
- Feature engineering: Create new features from existing features that might be more informative for the model. These can be transformations, aggregations or combinations of features.
- Data encoding: Convert categorical data into numerical data. It can be point coding, ordinal coding or binary coding.
- Data Splitting: Split your data into training and testing sets. The training set is used to train the model, and the test set is used to evaluate the performance of the model on new, unpublished data. Another step in the data mining process, when the end goal is to predict the outcome, is to create visualizations that help understand the outcome and discover the relationships between attributes and the outcome.

Recurrent Neural Network (RNN) Model for Crowd Prediction

Recurrent Neural Networks (RNN) possess the ability to acquire features and grasp enduring correlations within sequential and time-based data. RNNs are a type of artificial neural network architecture designed to handle sequential data, such as time series data or text. These networks are a series of non-linear elements, wherein there exists at least one interconnection between elements that forms a directed loop. Unlike traditional feed forward neural networks, which treat each piece of data independently, RNNs can "remember" information from previous inputs, allowing them

to learn complex relationships between elements in a sequence. RNNs achieve high accuracy through the use of hidden states. These are internal memory units that store information about the past inputs that the network has processed. An adeptly trained RNN has the capacity to represent any dynamic system such as multimedia streaming in vehicular networks. At each time step, the RNN takes in a new input and combines it with the current hidden state to produce an output. The hidden state is then updated to reflect the new information, and this process is repeated for all subsequent time steps.

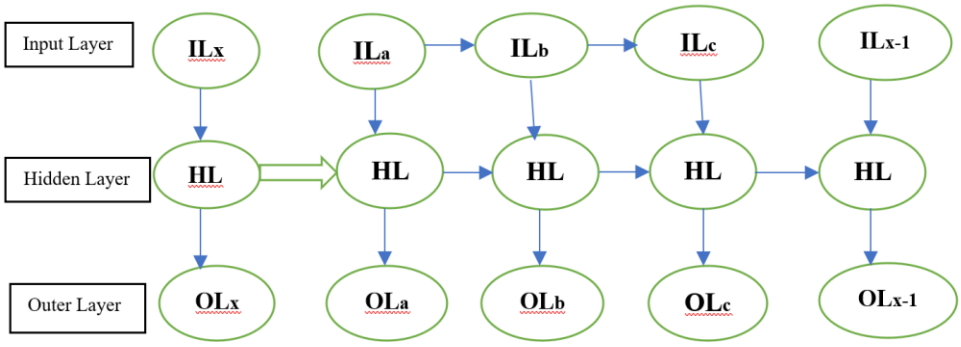

Figure 2: RNN Model Architecture

The LHS of Figure 2 depicts an RNN in its rolled form, while on the RHS, the RNN is displayed in its unrolled (or unfolded) configuration, representing a complete sequence of the network. At time step 'x', IL(x) serves as the network's input. HL(x) denotes a hidden state at time 'x' and functions as the network's 'memory'. Its computation is based on the current input and the preceding time step's hidden state:

$$HL(x) = f(U\ I(t) + W\ HL(x-1))$$

where 'f' is a non-linear transformation, such as ReLU.

The RNN encompasses connections from input to hidden layers, governed by a weight matrix 'U', recurrent connections from hidden to hidden layers, regulated by a weight matrix 'W', and connections from hidden to output layers, determined by a weight matrix 'V'. These weights are consistent throughout time. O(t) demonstrates the network's output. They have an inherent “memory” as they take

	information from prior inputs to influence the current input and output. One can think of this as a hidden layer that remembers information through the passage of time **Note:** In case of fabrication work in the project, an engineering drawing with dimensions / detailed design should be attached to the proposal.
14.	**Expected Outcome of the project:** • This prediction model allows companies to better manage passenger flows, adapt their service offer according to demand, reduce accidents and reduce waiting times for users. • Our methods accuracy improves with integration of additional data, such as local events, weather conditions or school holidays. • Our project will be useful for policy makers, transport managers and researchers interested in this important issue of public transport. • Our project will help in reducing the operational cost and also save fuel, through optimized scheduling of public transport. • Improved travel experience: Passengers can use crowd predictions to choose which bus to take or even decide to wait for a less crowded one. This can lead to a more comfortable and less stressful journey. • Reduced waiting times: Knowing which buses are likely to be crowded can help passengers avoid them, potentially reducing their overall waiting time. • More informed travel decisions: Crowd predictions can be integrated into navigation apps and public transport information systems, allowing passengers to make more informed decisions about their travel plans. • Enhanced safety: By avoiding overcrowded buses, passengers can potentially reduce the risk of contracting infectious diseases or being caught in a stampede.
15.	**Is the project proposed relevant to the Industry / Society or Institution?** **Yes / No: Yes.** **If Yes, please provide details of the Industry / institution and contact details:++** Predicting bus line crowd can have a number of positive outcomes, both for passengers and for the public transport system as a whole. Here are some potential benefits: **For passengers:** Improved travel experience: Passengers can use crowd predictions to choose which bus to take or even decide to wait for a less crowded one. This can lead to a more comfortable and less stressful journey. Reduced waiting times: Knowing which buses are likely to be crowded can help passengers avoid them, potentially reducing their overall waiting time.

	More informed travel decisions: Crowd predictions can be integrated into navigation apps and public transport information systems, allowing passengers to make more informed decisions about their travel plans. Enhanced safety: By avoiding overcrowded buses, passengers can potentially reduce the risk of contracting infectious diseases or being caught in a crush. **For the public transport system:** • Improved operational efficiency: Crowd predictions can help public transport operators to allocate resources more effectively, such as by sending additional buses to routes that are expected to be busy. • Reduced congestion: By spreading out passenger load, crowd predictions can help to reduce congestion on buses and at bus stops. • Increased ridership: A more reliable and predictable public transport system is likely to attract more riders, which can generate additional revenue for the operators. • Improved data-driven decision making: The data collected for crowd prediction can be used to inform other decision-making processes, such as route planning and infrastructure investment. (**Note:** Preference will be given to those projects relevant to the industry / institution. Hence be specific in giving detailed information). Is the industry extending support - technology / funds / use the final product, please specify.
16.	**Can the product or process developed in the project be taken up for filing a Patent?** **Yes / No:** **No** **Prior Art search done?** **Yes/No:** **Note:** If your answer is "Yes", you may contact Patent Information Centre of KSCST. For more details, email: pic@kscst.org.in

Budget details (break-up details should be given):

Note: KSCST will provide nominal grant support for carrying out the project by students if selected by the project selection committee.

Budget	Amount
a) Materials / Consumables (Please specify)	5000.00
b) Labor (Describe)	1.00
c) Travel (Describe)	2500.00
e) Miscellaneous (Please specify)	1.00
Total	7502.00

17. Any other technical details (Please specify):

1. RNN(Recurrent Neural Network) Model
2. Anaconda Navigator
3. Python
4. Jupiter Notebook
5. Visualization tools like bar charts, histograms, box plots etc.

18. SPP Coordinator (Identified by the college):

Note: To be identified by the principal of the institution. The project proposals must be submitted to KSCST through SPP coordinator designated by the principal.

Name: Dr. Gururaj S. Kori
Email id: korigurus@yashoo.com
Contact No.: 9986784608

Name of the Project Guide:
Prof. Varun P. Sarvade
Email id: varunpsarvade@gmail.com
Contact No.: 8277169183

Name of the HOD:
Prof. manjunath S. Gabasavalagi
Email id: Manjunath.gibbs@gmail.com
Contact No.: 9164940666

DECLARATION

(From Project Students)

(To scan this page and enclose in the project proposal)

We, the project team hereby declare that the details enclosed in the project proposal (Title of the Project: **Crowd Prediction for Bus lines using Artificial Intelligence** Branch: Computer Science and Engineering College: Biluru Gurubasava Mahaswamiji Institute of Technology are true and correct to the best of our knowledge and belief and we undertake to inform KSCST of any changes therein in the project title, students name will be intimated immediately through project guide. In case any of the above information is found to be false or untrue or misleading, we are aware that we may be held liable for it. We hereby authorize sharing of the project information with this project proposal with the Karnataka State Council for Science and Technology, Bangaluru.

We are aware that the project team must exhibit / demonstrate the project in the nodal centre and interact regarding project with the experts and to exhibit the project in the State Level Seminar and Exhibition (if selected). If the student team fails to attend the evaluation in nodal centre or fails to attend the State Level Seminar and Exhibition, the supported project amount will be returned to KSCST.

We also hereby, enclose the endorsement form to KSCST, Bengaluru.

Name of the students with USN No. **Signature with date**

1. Gopal R. Chenni (2LB20CS005)
2. Pradnya S. Bilagi (2LB20CS015)
3. Dhanush J. Yadav (2LB20CS003)
4. Niranjan S. Purad (2LB20CS013)

Prof. Varun P. Sarvade
(Name & Signature of Project Guide with Seal)
Email id: varunpsarvade@gmail.com
Contact No.: 8277169183

Prof. Manjunath S. Gabasavalagi
(Name & Signature of HOD with Seal)
Email id: Manjunath.gibbs@gmail.com
Contact No.: 9164940666

ENDORSEMENT

(From College, endorsement to be taken in the institution / Department Letter head)

(To scan this page and enclose in the project proposal)

This is to certify that 1) Mr. Gopal R. Chenni 2) Ms. Pradnya S. Bilagi 3) Mr. Dhanush J. Yadav 4) Mr. Niranjan S. Purad are bonafide student(s) of Department of Computer Science and Engineering in the degree program of our institution. If the project proposal submitted by these students under the 47th series of Student Project Programme is selected by KSCST, we will provide the requisite laboratory / Computer / infrastructure support in our college / Institution. Further we also take necessary steps to see that the project team will exhibit / demonstrate their project in the nodal centre and in the State Level Seminar and Exhibition (if selected). If the student team fails to send the completed project report or fails to attend the evaluation in nodal centre or fails to attend the State Level Seminar and Exhibition, the supported project amount will be returned to KSCST.

Prof. Varun P. Sarvade	**Prof. Manjunath S. Gabasavalagi**	**Dr. Shravankumar B. Kerur**
(Name & Signature of Project Guide with Seal)	**(Signature of HOD with Seal)**	**(Signature of the Principal with Seal)**
Emailid: varunpsarvade@gmail.com	**Emailid:** Manjunath.gibbs@gmail.com	**Emailid:** **shrevankerur@yahoo.com**
Contact No.: 8277169183	**Contact No.:** 9164940666	**Contact No.:**

DETAILS OF PROCESSING FEES MADE THROUGH NEFT / UPI PAYMENT

(**Note:** Include this page in the softcopy of the student project proposal. The student team shall furnish the details in the Google Form. It is informed to the students to 1) keep ready the softcopy of the project proposal and other documents and 2) Furnish the payment made details as processing fees and 3) update the details in the Google Form on the same day of payment made to KSCST by NEFT / UPI payment).

1. TITLE OF THE PROJECT	:	**Crowd Prediction of Bus line using Artificial Intelligence**
2. NAME OF THE TEAM LEADER	:	Gopal R. Chenni
3. EMAIL ID	:	gc700892@gmail.com
4. CONTACT MOBILE NO.	:	8073041564

PAYMENT MADE DETAILS

5. BANK REF. NO. / UTR NO. / UPI No. (12 digits)	:	
6. TRANSACTION ID	:	
7. NAME OF THE SENDER / ACCOUNT HOLDER and CONTACT NUMBER	:	
8. NAME OF THE BANK	:	
9. PROCESSING FEES	:	Rs. 1000/-
10. DATE OF PAYMENT MADE	:	
11. TIME	:	
12. MODE OF PAYMENT MADE (NEFT / UPI, PLEASE SPECIFY)	:	

(Name & Signature of the team leader)

(Name & Signature of Project Guide or HOD with Seal)

KARNATAKA STATE COUNCIL FOR SCIENCE AND TECHNOLOGY

Indian Institute of Science campus, Bengaluru

47th SERIES OF STUDENT PROJECT PROGRAMME (SPP)

(Note: This page is for information about bank details of KSCST to the student team and college / institution and not to include this page in the project proposal softcopy)

BANK ACCOUNT DETAILS OF KSCST

Name and address of the Institution	Karnataka State Council for Science and Technology, IISc Campus, Bangalore -560012
Account holder's name / Designation	Secretary, Karnataka State Council for Science and Technology
Bank Account No. & Name of the bank	Current A/C No. 0683201000024 Canara Bank, IISc Campus Branch, Bangalore-560012
IFSC Code	CNRB0000683
MICR Code	560015023
Bank Branch Address	Canara Bank, Indian Institute of Science, Bangalore-560012

BANK DETAILS

Name of the Agency	Karnataka State Council for Science and Technology IISc Campus, Bangalore - 560012
Account holder's name / Designation	Secretary , Karnataka State Council for Science and Technology
Bank Account No. & Name of the bank	Current A/C No. 0683201000024 Canara Bank IISc Campus Branch Bangalore-560012
IFSC Code	CNRB0000683
MICR Code	560015023
Bank Branch Address	Canara Bank Indian Institute of Science Bangalore-560012