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REAL TIME STREAMLINED MULTITASKING TECHNIQUE FOR SOFT AND HARD DEADLINE TASKS.

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Abstract:

Now a day, train journeys became more often. Many passengers are rushing towards trains for their journey and this leads to an inconvenience to the crew member when he/she serve the passenger request. The quality of service is very poor, because the issue of the service is not completed within less time. In economic survey 2018 it was clearly mentioned that the railway constitution should facilitate concept of automation techniques for servicing passenger's requirements. an IoT system will provide some automation technique through CSRA (Composite Scheduling Resource Algorithm).algorithm. Scheduling referred as to 'when to do' and 'what to do'. This scheduling algorithm will fairly as well efficiently distribute the requests to the crew members there by the bottleneck (inconvenience) of crew member will be reached.

I. *INTRODUCTION*

The scheduling is planning about how efficiently utilize the CPUs time. For that IoT based system[1] is involved. Mainly it comprised of smart phone for making and providing services, Raspberry pi 2 model B for scheduling and it will guides the crew members while providing the services. In The existing system, passengers will place the requests by making call to the rail officer with toll free number provided on ticket. But In some territory areas mobile phone signals may not be available so in that area the passenger cannot make the requests and this is one of the major pitfalls of the existing system. Here in each and every compartment one Raspberry pi 2 model B(controller)[8] and among them one will be imitate as master.

The passengers will makes requests with the application provided in their smart phone. The randomly made requests are collected by the controller which is placed in each and every compartment. The collected requests are rearranged and distributes those requests are fairly to the crew members. Here one of the main assumption is the address location of the crew member is under surveillance of the Whenever crew member enters or exit the compartment automatically crew members smart phones Bluetooth beacons are radiated and it will be sensed by the controller there by position of the crew member will be found out if programmed to do so. The main aim of this paper is to reduce time gap between crew member and the passengers. It is possible by assigning the tasks to the crew members such that he can efficiently serve to the nearby compartments. Each and every pi model receives the some requests in their respective compartments and forwarded them to the master when it senses the crew members Bluetooth beacons. The pi model repeatedly transmits those arrived requests to the master. Scheduling and reallocation of the requests are done by the master and also for distributes them to the crew members.

II. *SCHEDULING ALGORITHMS*

Scheduling is the process of deciding which calling process has to obtain the CPUs clock cycles or memory or display unit etc.., this

helps to process the different calling process or thread in parallel. So scheduling concept is very essential wherever multitasking has to be taken place. there are different types of scheduling algorithms those are listed below.

1).***First Come First Serve (FCFS)***[9]: In First come first serve scheduling algorithm, whichever process makes the requests at first and the CPUs clock cycles will be provided to that process only. here FIFO (First in first out) queue will holds those process Id along with what kind of resource is exactly requested also their expiration time. It is non-preemptive type.

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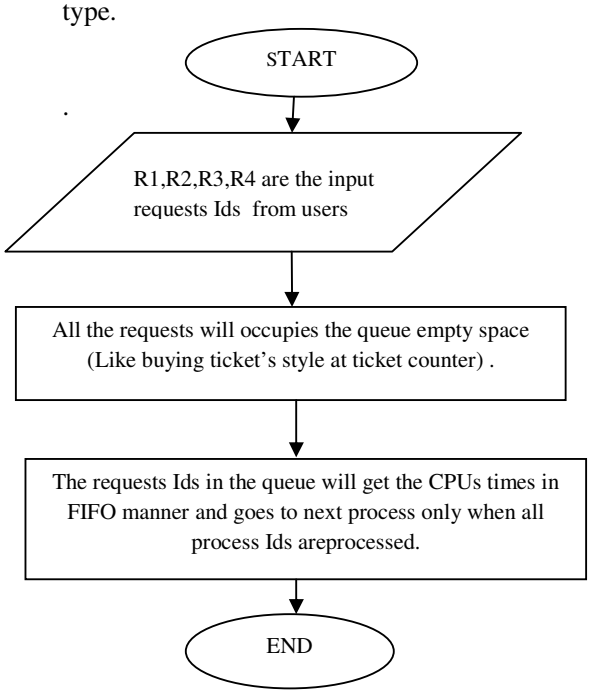
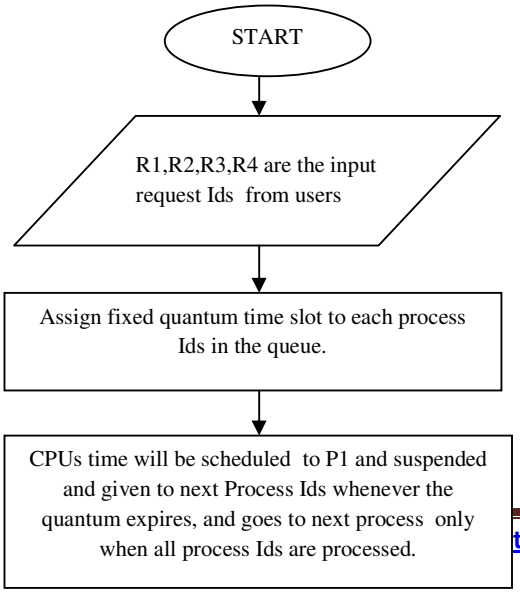
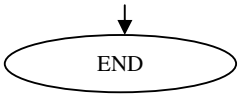


Flow chart1: First come first serve.

2).***Round Robin scheduling algorithm***[8]: In this algorithm the different tasks gets fair sharing of CPUs clock cycles.



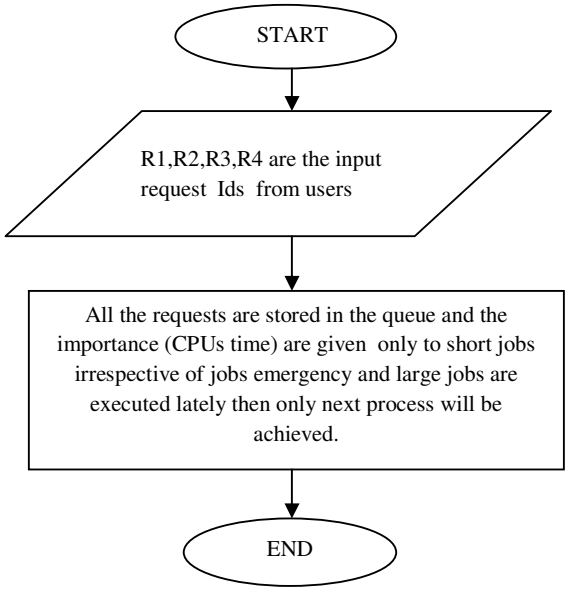


Flow chart2: Round Robin algorithm.

Here every process has same quantum time slices, after expiration of those quantum slices then current executing process will put into waiting state until one loop is completed.

The major pitfalls of this scheduling algorithm are context switching will become the overhead and also time taken finish the all processes are huge. And it offers bad waiting time.

3) ***Shortest Job First (SJF)*** [8]: Whichever the processes requires less time to complete its task that kind short jobs are allowed to utilize the resources.

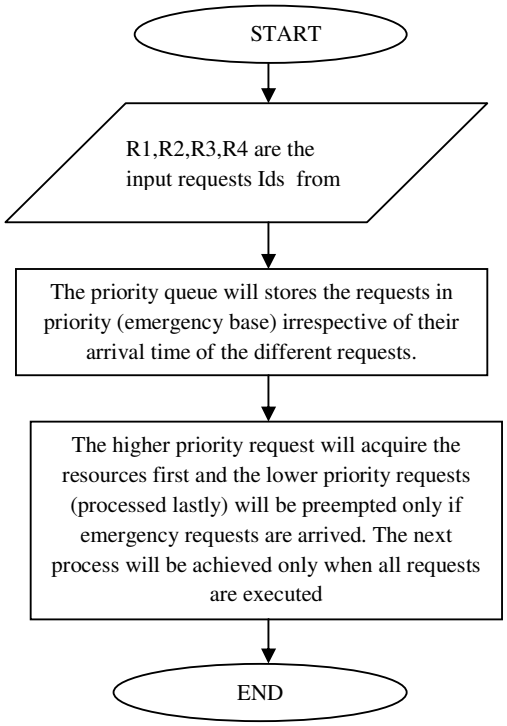


Flow chart3: Short job first algorithm.

It can be used in either pre-emptive or non-pre-emptive manner. the main drawback of this algorithm is largest jobs may get less possibility for acquiring CPUs times.

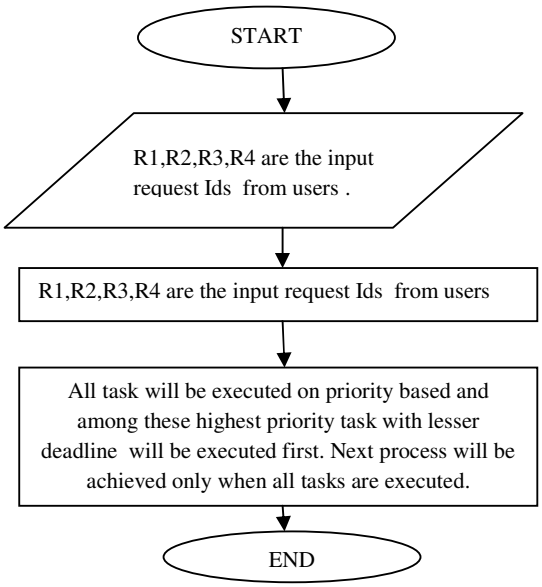
4) ***Priority based algorithm***[8]: Each and every calling processes will has their priority value. The highest priority task is forwarded to have the required resources and lowest priority task will lately allow to acquiring the resource. Suppose if two calling processes has equal priority then the resource allocation is done based on their arrival time. NOTE: the soft deadline tasks[9] is one of the task which does not bring any harm to the total system even though it is not serviced within the deadline so

it is called soft real time system, but total system will be damaged(if service not done within deadline) in hard deadline tasks is called hard real time embedded system.
The problem of this algorithm is starvation of lowest priority tasks. Hence it will not offer the good average waiting time.



Flow chart4: Round Robin algorithm.

5).Earliest deadline first[8]: this is also called as least time to go is a dynamic scheduling algorithm used in RTOS (Real Time Operating System).



Flow chart5: Earlier deadline first.

here the queue will be searched for the process is very closest to its deadline. This is almost similar to the short job first or in other words the SJF will become Preemptive EDF if we organize the SJF under preemption technique.

6).***Composite Schedule Resource Algorithm (CSRA)***: this is algorithm is used in the IoT system. And It is comprised of four scheduling algorithm those are priority based, EDF, SJF, FCFS. This newly introduced algorithm will fairly distribute the resources to the different processes efficiently.

The CSRA algorithm will execute itself repeatedly for every 100 seconds and While executing the master controller will produce the new rearranged requests lists and these new arranged requests lists are collectively given to the crew member.The resource allocation of the crew member as follows.

1). There are number of pi model placed in each and every compartment and among them one will be acts as master.

2). each pi model in every compartment will receive randomly produced requests from passenger's mobile phones application.

3). Randomly collected requests are forwarded to the master when it senses the crew members mobile phones Bluetooth beacons, the master device will runs the CSRA algorithm.

4).The rearrangement of collected requests will be done at master. The most highest priority tasks will occupies the first few numbers in rearrangement lists. Here the static priority is assigned to each and every requests as given below in table form.

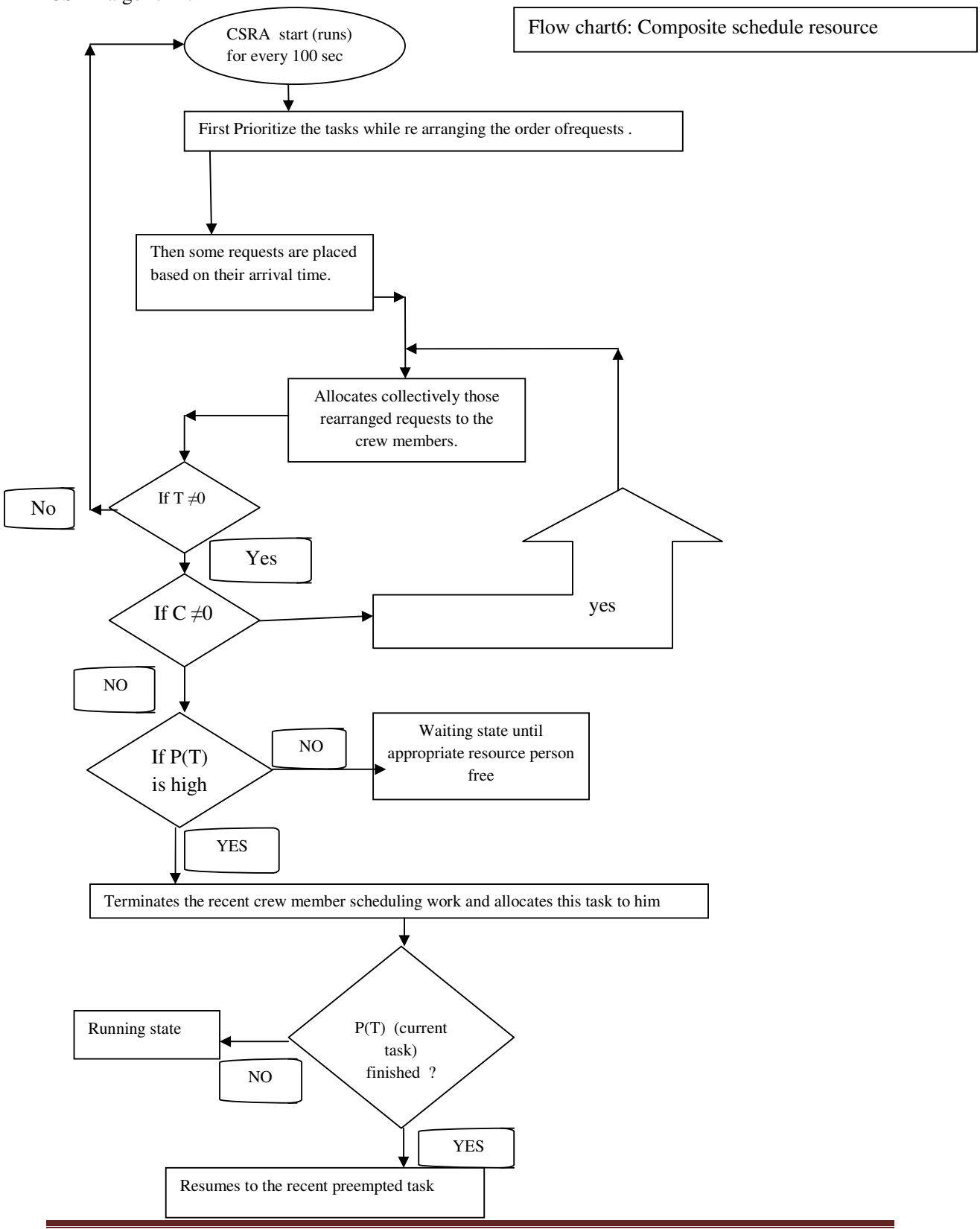
Priority (P)	Type of requests
01	Fire or security issue
02	Health emergency
03	Meal and water
04	Cleaning

Table 1: types of requests with priority.

5). Later on, the some other requests are placed based on their shortness of the job and arrival times.

6). While CSRA running, if any requests are made during this mean while, then the master will checks the priority of newly arrived requests and takes the appropriate decision that means if it has highest priority then immediately assigns to the crew member (if he is free).

CSRA algorithm:



7). If no crew member is available for that newly arrived task then the master device will terminates the recent crew member and assign this task to him automatically.

8). If the newly arrived task has low priority then at that time again if all crew member is engaged then it just puts them in to the waiting state until the appropriate resource become free. And this process continuous as long as requests (atleast one requests) are made by the passengers. where the notations are T,C and P(T). the T referred as newly arrived task, C is referred as crewmember and P(T) is referred to as Priority of newly arrived task. Make sure that all straight arrows represents is if YES and all side arrow (from conditional diamond box) will represent NO. Only the reserved candidates (passengers) can utilize this facility within the train and not possible for unreserved passengers. Preemption of the lower priority task will be done when only after completion of the co-ordination process between master controller and crew member.Herethe co-ordination is acknowledgement should be produced from crew member's mobile phone when master controller posts the permission to that crew member about to suspend the current job.The randomly created requests are transmitted from each and every coach by the means of wireless transmission through Wi-Fi. CSRA algorithm offered good results when compared to the existing method.

III.***COMMUNICATION BETWEEN USERS AND PI MODEL***:How the resource allocation installed within the train as shown figure below .

fig.1: communication between many users and pi model. The above figure 1 gives the information about how[3] the pi-node are placed and deploying within the train. Every pi-node has a user interface through which the user can make the requests. Further every pi-model is aware of IP address of master or central server (the center coach will acts here as central server) as well next or preceding pi-nodes in consecutive coaches. In addition to this each pi-node has minimum two Bluetooth module transmitters are connected. These transmitters (also acts as receiver for intimating crew member position) are located at entrance and exit places of the coach so as to ensure that a service provider receives the beacons so the position of the crew member will be known whenever the crew member receives the beacon id of Bluetooth transmitter and the central and this is how means, the central server has all the details of each and every pi-node Bluetooth ID. Once the pi-node receives the crew members ID(crew members Bluetooth ID) then the pi-node will transmits crew ID along with its ID through WI-FI. The central server will frame the requests which very feasible to serve by him. Here all the details of the reserved passengers are stored in database at central server.

IV.*EXPECTED RESULTS*: The comparison ofall scheduling algorithm is given in table below.

Requests Ids	Execution time	Arrival time	P(priority value)
R1	6	1	3
R2	5	2	2
R3	9	3	1
R4	7	4	4

Table1: Requests details

Algorithms	Average waiting time	Average response time
FCFS	9.22	16
SJF	8.22	12.75
RR	17.55	17.55
PRIORITY	10.75	17.5
EDF	9.25	16.25
CSRA	Will be Less	Will be Less

table2: comparisons all scheduling algorithms.

The CSRA algorithm will be effectively used for any soft and hard real time multitasking process. It overcomes pitfalls of all existed algorithms as well existing servicing system in a train and completely avoids the problems of intruder. The simulated results are displayed with the help of the mat -lab 2013.the x-axis is referred as number of times the csra executed and y axis referred as speed up facto. Approximately CSRA algorithm will schedule

the number of requests 20-45 percent more speed than the conventional algorithms.
The speedup factor [4] of the system is calculated based upon formula given below:

$$Speedup(S) = (M_{ed} - M_{pd})/Med.$$

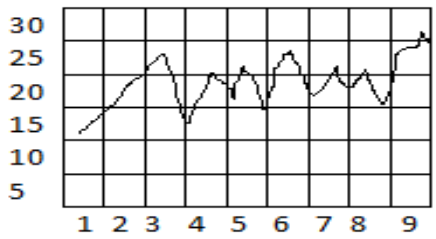


fig.2 : Speedup factor between the proposed and the conventional system. Where, *Med* and *Mpd* are the time taken by the proposed system and the existing system respectively. Fig.2 illustrates the speedup factor of the system calculated on the same test cases which are reported in Figure in 6. The average speedup was found to be around 20%.

V. CONCLUSIONS

In this paper, we are developing an IoT based system for avail services to passenger requests in the train journey. A Location and task allocation system has been proposed to track crew members within the train. The CSRA resource allocation uses this information for optimizations in addition to the workloads are distributed very fairly among crew members. The algorithm utilizes both - preemptive and non-preemptive approaches depending upon the priority of the request(s).

VI. REFERENCES

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