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An Intelligent On-Board Passenger Service System (PSS) in Railways using Internet of Things (IoT)

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Abstract: ***Railways represent one in every of the foremost extensively used modes of transportation within the world. Indian Railways is one of the largest networks which of the people are a prime concern. It focuses on the key areas such as quality of food prepared, quality of water, personal hygiene, providing medical aid, cleaning and security are served and its impact on people's well-being. In this paper, an Onboard Passengers Service System (PSS) is used to get good services and comfort in railways within train. When the passenger request for various services are collated periodically and then allocated to crew members on taking into consideration their services time and location of crew member. Then, according to the request, the services are provided to the corresponding passengers within time. To allocate the services to crew members, we use Multi Objective Resource Allocation (MORA) algorithm and scheduling algorithm (FCFS). ZigBee device is used to transmit the data between passengers to crew members.***

Keywords: Internet of Things (IoT), ZigBee, Passenger Service System (PSS), Multi Objective Resource Allocation (MORA), FCFS.

I. INTRODUCTION

With the arrival of latest technologies, railways have veteran immense transformations in its operational and architecture that has resulted throughout an enormous increase inside the complexity of the system. In rail passenger traffic is one of the growing needs is to automate passenger comfort and related services it's not fulfil, exists a trade-off between fair allocation of task and the associated delay. The railways are provided dedicated helpline numbers in case of any need or contingency. Railway officials are used handheld devices for communication among the peers. This mode of communication ensures reliability but at the same time affixes cellular cost to the existing system. Further, the dependency on cellular signals makes the system non-functional in dark territories of rail networks where such signals are unavailable. This hand operated on-demand model does not ensure the desired Quality of Service (QoS) and can cause lowering of productivity. QoS, in such scenarios, refers to satisfying timing constraints, reliability and providing demand specific services. The existing procedure for servicing requests followed by the Indian Railways comprises making a phone call to a designated number. The concerned railway personnel receive the call and then register this request and allocate the related resource on a first come first serve basis irrespective of the location of the resource. Major causes of passenger discontentment are due to the inattentive behaviour of rail crew towards addressing passenger issues during rail journeys. The IoT is a "Network" of 'Things' that can create data and connect to internet or to network. It can able to collect and exchange information between in a secure way. The concept of an IoT heralds a vision towards a fully connected world wherein users can control virtually anything from anywhere. There are many areas where leverages of IoT can be tie together. The railway network is also one of the application domains where IoT related concepts can be implemented to make a system coherent. In this paper, we provide an approach for servicing onboard passenger needs inside the train.Traveler requirements for various services are collated periodically and then allocated to crew members inside the train, taking on account of their services time and their workload feature. Then, according to the need, the services are provided to the corresponding passengers within time.

II. RELATED WORK

An independent IoT system is proposed to help passengers in a long job of railways to receive good service and console from railway crew.We currently concentrate on the passenger service requests being attended to by the crew within a railway train. The crew members by themselves from their device who eventually satisfy the requests. Multiple requests from the passengers are collected and allocated to the crew member to provide the requested service to passengers in short time.

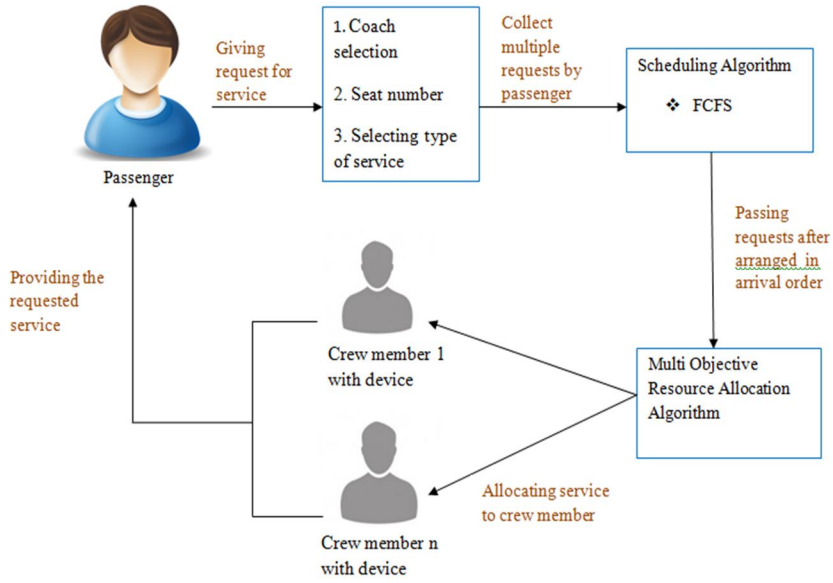

Fig 1. Block Diagram for PSS

III.DEVICES DESCRIPTION

A. Keypad

A keypad is a set of buttons or keys bearing digits, symbols and/or alphabetical letters placed in order on a pad, which can be used as an efficient input device. It is used to select the coach selection, seat selection & Requirement selection. Here the requirements of word are defined as following categories are

1) Food Requirement
2) Medicine Requirement
3) Water Requirement
4) Emergency Help

B. Lcd

It is used for display the process for user support. It is controlled by Arduino Uno. The user requirement will be forward to ZigBee & Wi-Fi modules. Wi-Fi module is connected with cloud server, which was monitored by Railway department.

C. Zigbee

ZigBee is communicated with railway Support employee kit. ZigBee is a cost- and energy-efficient wireless network standard. One of ZigBee's defining features it is able to provide the secure communication.

Mode	Switch1	Switch2	Result
0	0	0	Catering
1	0	1	Medicine
2	1	0	Security
3	1	1	Cleanliness

Table1.Mode selection table for crew members

D. Arduino Uno

It collects the information from pc &display. It is fixed in every coach within the train. After the user requested for a service, depend upon the result the railway officials send the employee who one nearby that compartment to fulfil user requirement.

IV. MODULES DESCRIPTION

A. Information Collection

In case passengers require a service from rail crew, they need to feed the request information through a user-interface connected to the microcontroller within the coach. This request information includes their registered mobile number, the coach number, seat number and Type of Request required. The user interface is very simple to understand and operate for the normal user thereby making the system convenient.

B. Service Selection

In this, when passenger need any kind of service, they can select from the list of available service in the device. The type of request could be catering, requirement of medical aid, security and cleanliness.

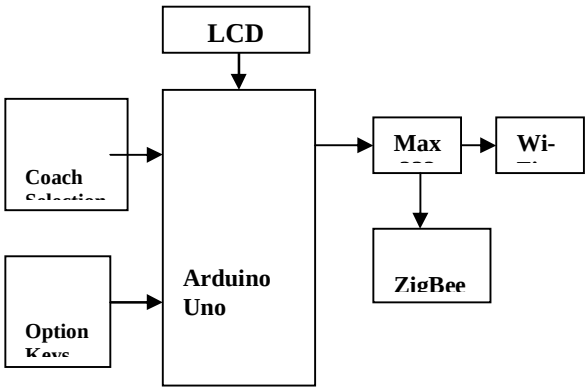

Fig 2. Block Diagram for Compartment Section

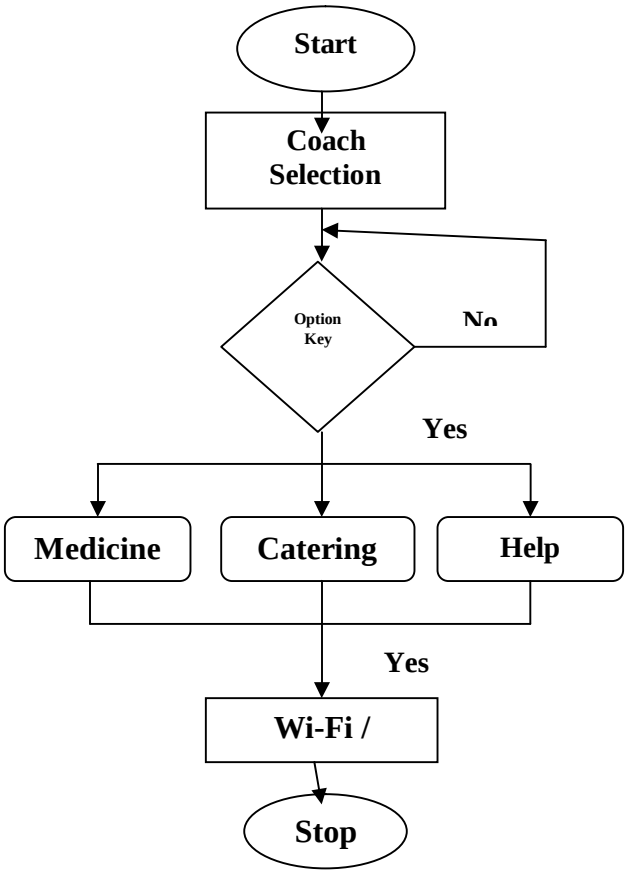

Fig 3. Flowchart for Compartment Section

C. Service Allocation

The service is allocated to the crew members after the service is selected by the passenger.Allocation of service can be done using two algorithms. First, the multiple requests from passengers are collated and arranged based on the arrival time by FCFS algorithm. Then, the service requests are allocated to crew member to provide it to the requested passenger by using MORA algorithm.

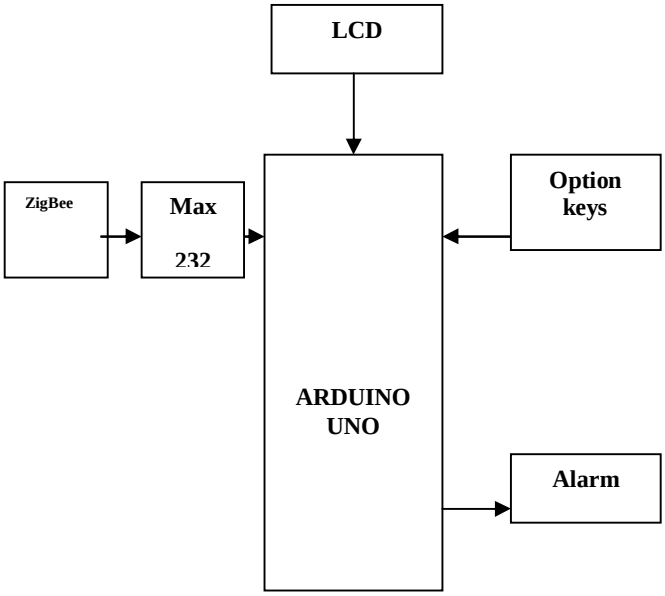

Fig 5. Block diagram for crew member device

D. Alarm Notification

An alarm sound is produced in an Arduino Uno to notify the crew member that the service requested by the passenger is allocated to them. After that they saw the requested information in their device and provide the requested service to the corresponding user within time.

V. ALGORITHM

A. Multi Objective Resource Allocation Algorithm (MORA)

The Multi-Objective Resource Allocation (MORA) addresses the important issue which seeks to find the expected objectives by allocating the limited amount of resource to various activates.

```
    //Constants
  Constintled Pin = 3; //Led to Arduino pin 3 (PWM)
  //Variables
  bool started= false;//True: Message is started
bool ended = false;//True: Message is finished

char incoming Byte; //Variable to store the incoming byte

  char msg[3]; //Message - array from 0 to 2 (3 values - PWM - e.g. 240)
  byte index; //Index of array
void setup () {

//Start the serial communication
Serial.begin(9600); //Baud rate must be the same as is on xBee module
pinMode(ledPin, OUTPUT);
}

void loop () {
while (Serial.available() &gt;0) {
```

```
//Read the incoming byte
incomingByte = Serial.read();
index = 0;
msg[index] = &#39;\0&#39;; // Throw away any incomplete packet
}
//End the message when the &#39;&gt;&#39; symbol is received
else
if(incomingByte == &#39;&gt;&#39;)
{
ended = true;
break; // Done reading - exit from while loop!
}
//Read the message!
else
{
if(index &lt; 4) // Make sure there is room

{

msg[index] = incomingByte; // Add char to array

index++;

}

}
```

VI. RESULTS

Fig 6. Coach selection

Fig 6.1 Selected Coach

Fig7. Service Selection

VII. CONCLUSION

In this paper, we have proposed an IoT based Rail system for passenger services and comfort in railways during the train journey.Any passenger of railways must easily get the required service within time.The main goal of our system is in short time passenger satisfaction. This project is mainly concerned about uploading passenger's data on server of railway system and providing them necessary services. From this, it is concluded that passengers will be provided with the required services within time.

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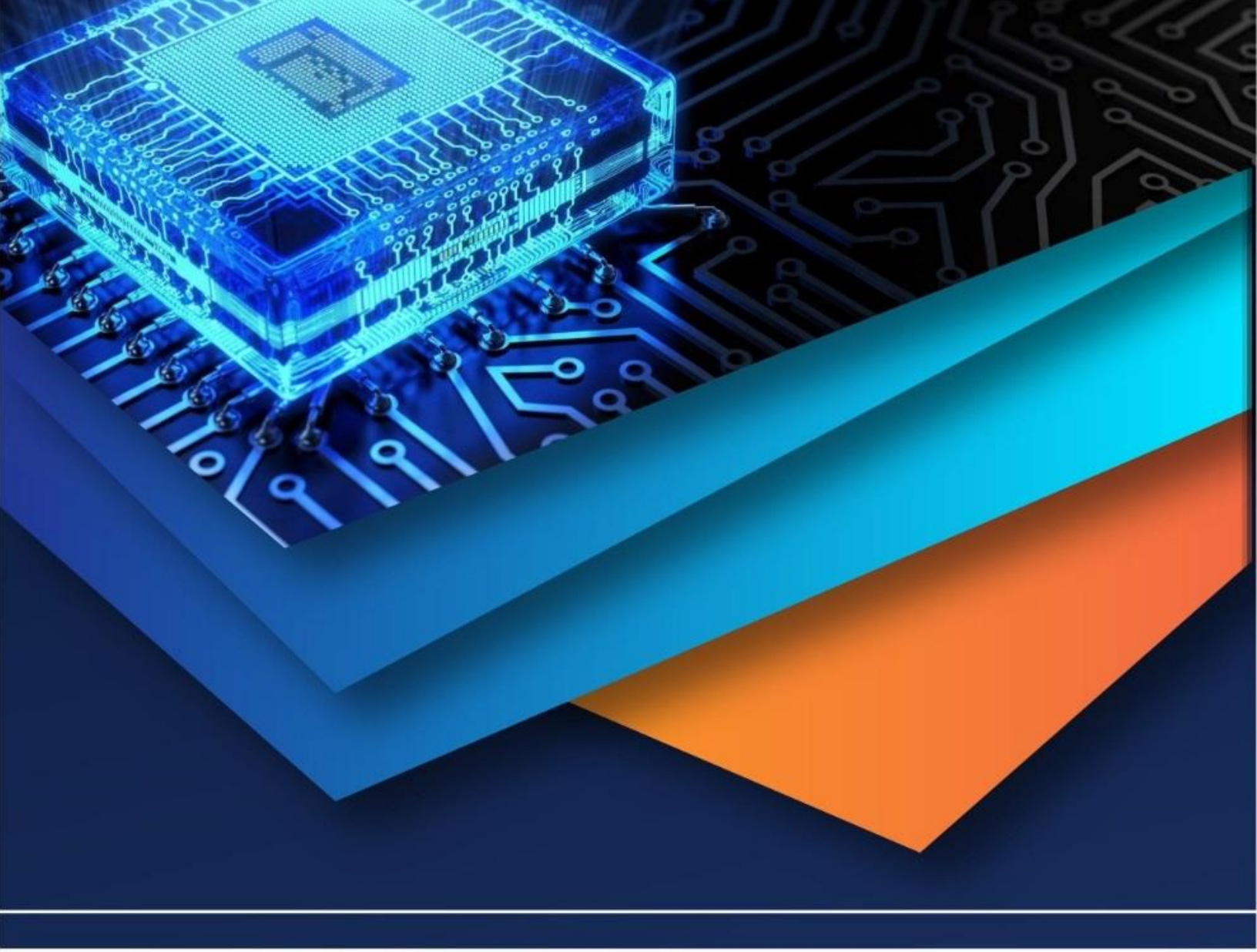

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