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AUTOMATION OF DRIVING LICENSE TEST USING WIRELESS SENSOR NETWORK

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Abstract-*To prevent illegal licenses and therefore causing accidents ,a new automated system is proposed .This system can be implemented using Bayesian logic classification algorithm and feature extraction algorithm .The proposed system need to design the wireless sensor network and also the multi sensor fusion based detection approach for detecting result.*

The map management is also needed to compare the test data from Global Positioning System with reference data .Mapping and multi fusion sensor combination transmission is done using remote server. The Bayesian classification algorithm is implemented with data mining for result. ZIGBEE is used as a gateway.

The system also implements Image processing which includes real time image comparison with reference images for driving license test sign indication.

The proposed system is the elimination process of existing process to issue Indian driving license .For this the applicant will be allotted the test vehicle for test drive with the number of sensors connected embedded in vehicle sending data using wireless sensor network to remote server to get processed. Result analysis is done by comparing the received data with previous data

Key words *: WSN ,GPS ,Data Mining ,Map matching ,multi sensor fusion –based detection approach ,ZIGBEE*

1. INTRODUCTION

A driving license is an official document certifying that the holder is suitably qualified to drive a motor vehicle .One person is dying in road accident in every 30 seconds because of ineligible drivers with illegal license .So it is very important to disassociate the driving ability test from the licensing authority.

1.1 Proposed work

The proposed work is thus the elimination process of existing scenario to issue Indian driving license .For this the applicant will be allotted the test vehicle for test drive with the number of sensors connected embedded in vehicle sending data using wireless sensor network to remote server to get processed. Result analysis is done by comparing the received data with previous data .Also the driving test sign indication by hand movements will be done using image processing which includes comparison of real time images with reference images.

Bayesian algorithm is used for decision making by comparing data from sensors .The sensors used are Gyro sensor to define coordinates in terms of longitude and latitude of a test vehicle .While RPM sensor is used to sense and measure speed at every angle of test vehicle .Wireless sensor network includes Global Positioning System(GPS) and ZIGBEE device.GPS provide data for mapping, receives X,Y,Z coordinates according to position of a vehicle .ZIGBEE is used as a gateway .Map management includes map matching using grey scale and pattern matching .Data mining is used to filter data .Image processing includes image segmentation, Gesture work define by using fix camera .The Software required for proposed work is, .Net for visual data ,while MS ACESS for back end application .The software is designed for front end and back end saperately.

1.2 Work Done

A method of 3D Mapping with an RGB-D Camera is provided by Felix Endress, Jurgen Hess ,Jurgen Sturm, Daniel Cremer and Wolfarm Burgard [1].This method describes a mapping system that produces highly accurate 3-D maps using an RGB-D camera. This requires no further sensors . With only availability of low-cost and light-weight RGB-D sensors such as the Microsoft Kinect , has domestic application such as vacuum cleaners. Experiments shows that this system can deal with challenging scenarios such as fast camera motions.

A method of Smart TV Interaction System Using Face and Hand Gesture Recognition is provided by Sang-Heon Lee, Myoung-Kyu Sohn, Dong-Ju Kim, Byungmin Kim, and Hyund [2].In this author gives a vision-based face and hand gesture recognition system for the control of smart TV. A face and hand gesture recognition module for channel/volume changing services and personalized services such as favorite channel, parenting guidance, etc is implemented.. For hand detection, a

data fusion technique is used. The hand posture detected using the Adaboost algorithm and the repeated detection is used for tracking algorithm. The tracking based on Adaboost is limited by the static view and required hand size. After hand detection, five types of hand gestures such as "left", "right", "up", "down", and "push" are recognized using support vector machine (SVM) .

Sensor Fusion for Precise Autonomous Vehicle Navigation in Outdoor Semi-structured Environments is the method of Autonomous Vehicle Navigation in Outdoor is provided by L. Conde Bento, Urbano Nunes, Fernando Moita and Ant´onio Surrecio [3].In this paper authors presents a system for guidance of autonomous vehicles navigation in semi-structured outdoor environments. It collects encoders data and absolute positioning data produced by landmarks and artificial beacons. A laser range sensor , and magnetic sensing rulers were developed to detect magnetic markers buried in the ground. In the first fusion stage, data from four wheel encoders and one steering encoder are fused by means of an Extended Kalman Filter(EKF), providing in condition of undesirable effects of wheels slippage , In a second fusion stage is processed for collecting absolute positioning data. Simulation and experiments based on real time using a four-wheels actuated electrical vehicle are presented.

A Multi-Sensor Fusion System for Moving object Detection and Tracking in Urban Driving Environments is introduced by Hyunggi Cho, Young-Woo Seo, B.V.K. Vijaya Kumar, andRagunathan (Raj) Rajkum [4].In this paper authors describe a self-driving car, in real-world driving environments, must be capable of accurately detecting and tracking of nearby moving objects. In this paper authors present new, moving object detection and tracking system that extends and improves earlier system used for the 2007 DARPA Urban Challenge. Earlier motion and observation models for active sensors (i.e., radars and LIDARs) and introduced a vision sensor. In the new system, the vision module detects pedestrians, bicyclists, and vehicles to generate corresponding vision targets. New system utilizes visual recognition information to improve a tracking model selection, data association, and movement classification of earlier system

Data mining and Data Gathering Algorithm in WSN is introduced by Vickey Sharma in [5] .The author describes ,WSN ,Data collection and routing mechanisms for WSNs and Data mining in Sensor Networks:

-Wireless Sensor Networks

A wireless sensor network is a set of sensor nodes arranged into a network.WSN is a distributed networks of wireless sensor nodes , which is used to monitor the system . Two sensor nodes that can not reach each other directly can transmit on other sensor nodes to exchange data between them in general data packets from the source node have to travel multiple hops before they reach the destination.

-Data collection and routing mechanisms for WSNs

The data collection and routing mechanisms for WSNs can be divided into two categories:

1)Event based data collection :In event – based data collection, sensors are responsible for detecting and reporting a specific event to one or more sinks.

2)Periodic data collection: In periodic data collection ,all sensor nodes periodically change their observations to the sink based on latest information of the interested data .In addition ,multi hop-relay approaches involve huge amounts of data exchange between nodes ,in addition many overheads to maintain the network architecture.

-Data Mining in Sensor Network

Data mining in sensor networks is the method of selecting application oriented standards and patterns with acceptable accuracy from a continuous fast and probably non ended flow of data stream from sensor networks .In this all data cannot be stored and therefore must be processed quickly. Data mining methods has to be very fast to process high speed arriving data..The current data mining methods handle the stationary data and employes the multistep methods and multi scan mining algorithms for reviewing constant data-sets. Therefore, these new data mining methods are not efficient for handling the large quantity of the data generated by the WSNs .The aim of the data mining process is to extract information from a data set and transmit it into an understandable structure for further use.

Distributed And Scalable Graph Pattern matching models and algorithms is introduced by Arash Farad , M.Usman Nisar,John A. Miller,Lakshmish Ramaswamy [6].The author introduces a new pattern matching model ,called tight simulation ,which is different from the previous models in its family in respect of scalability while preserving their important properties .It also presents a novel distributed algorithm based on the vertex-centric programming . Graph pattern matching, is important class of queries, used to find subgraphs of a data graph that are similar to a given query graph. This

problem has been studied over the past several decades ;however the modern application domains such as social networks and the World Wide Web (WWW)have interest in highly scalable graph pattern matching algorithms.

The Map Matching Algorithm Of GPS Data With Relatively Long Polling Time Intervals is described by Jae-seok YANG , Seung-pil KANG , Kyung-soo CHON [7]In this paper authors briefly described Map matching algorithm and its classification .Algorithms of the map matching have been developed continuously and they can be classified into two categories roughly. First, map matching algorithms which consider only geometric relationships between GPS data and a digital map. Secondly, map matching algorithms which Consider not only geometric relationships but also the topology of the road network and the history of GPS data. It has been reported that the latter worked better mostly.

- The first map matching algorithms can be classified again into the map matching algorithm using the distance of point-to-curve, one using the distance of curve-to-curve and one using the angle of curve-to-curve.
- The second map matching algorithms use the result of map matching at time t-1 for the map matching of GPS data at time t. And for the selection of candidate segments which GPS data will be matched, the topology of the road network is used as input. But these algorithms should be used under particular conditions. For example, if the result of map matching at time t-1 is wrong then the result of map matching after that time will be wrong also. Thus, it should be guaranteed that the result of map matching at time t-1 is exact to use these algorithms. Besides, if the vehicles with a GPS receiver follow abnormal routes(e.g. the left turn on the left turn restricted intersection) the right result of map matching cannot be expected because the normal topology respects traffic regulations.

2.Research Methodology

The block diagram of hardware design for proposed work is as shown in figure 2.1, bellow.

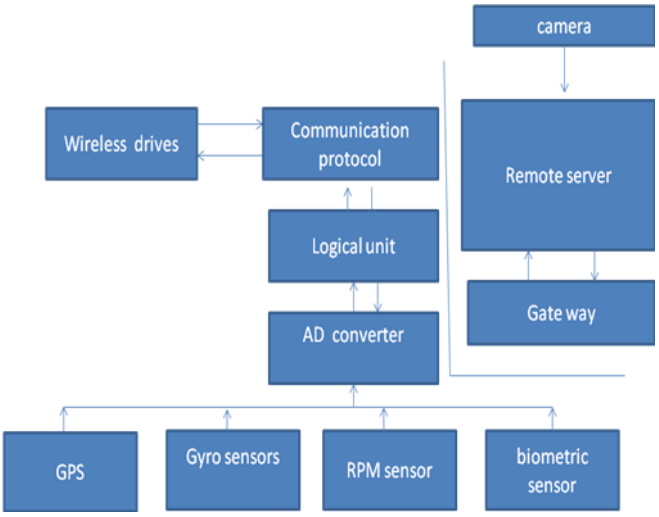

Fig 2.1 :Hardware architecture

The block diagram software design of proposed work is as shown in fig 2.2 ,bellow

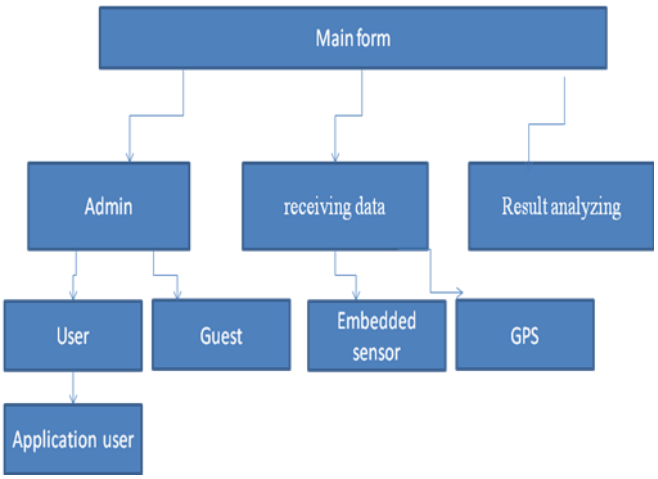

Fig 2.2:Software architecture

1)Multi Sensor Fusion Method using Dynamic Bayesian Network:

Multi-sensor fusion strategy is a novel road-matching method to support real-time navigational features within advanced driving-assistance systems. Managing multi hypotheses is a useful strategy for the road-matching problem. The multi-sensor fusion and multi-modal estimation are implemented using Dynamic Bayesian Network.

2) Map Matching Algorithm Of GPS Data

Many map matching algorithms have been introduced to match GPS points to a digital map previously. But there was short polling time intervals (about 1 second) of the GPS data. The map matching algorithms of such studies are not appropriate for the GPS data with relatively long polling time intervals (about 2~5 m)

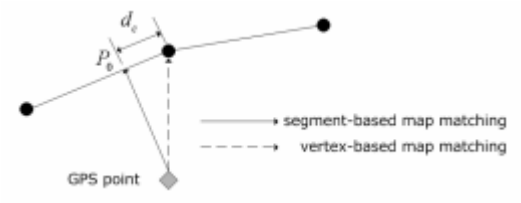

Fig2.3: Vertex-based and Segment-based Map Matching

3)Result analysis of receiving data and previous data

Bayesian Theorem is a means of quantifying uncertainty. Based on probability theory, the theorem d leads to a number representing the degree of probability that the hypothesis is true. To demonstrate an application of Bayesian theorem can be given by

$$p(A|B) = p\{A + B\}/p\{B\}$$

4)Feature extraction algorithm

These methods include pixel-matching method, rule based method and descriminant function based method. For discriminant function based method, we describe 2 sub-methods. They are prototypes based method and training based method. We analyze accuracy of gestures for these methods, and also analyze their distinguished capability when identifying gestures and alphanumeric in same recognizing mode.

3. CONCLUSION

The proposed automated driving license test is advantageous over existing manual test .It not only promises the accuracy in driving ability test but also disassociate the test from licensing authority . Thereby will help in reducing the road accidents due to illegal licenses.

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