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Intelligent automatic traffic control using IoT

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ABSTRACT

With an outsized population and enormous quantity of vehicles, there's conjointly a giant hassle of automotive accidents or road accidents, and with these overcrowded roads, there's a problem of delay in first aid service. To overcome this delay in first aid service, our project gives a solution that is "Intelligent Automatic Traffic Control with Ambulance Using IoT" which includes alerting and tracking mechanism with automatic traffic light controlling system such that the ambulance can achieve a freeway in order to provide the first aid to the patient as fast as possible. To monitor the traffic level, we use IR sensors. The level of the traffic is updated in the server page using IoT. The RF Transmitter and receiver is used to detect the ambulance arrival. The traffic signal is controlled automatically.

Keywords— *RF Module, Arduino Uno, IR Sensor, Alarm, IoT*

1. INTRODUCTION

Intelligent transportation system ITS)-based solutions strongly affect the traffic and transportation in cities or countries. Thus, governments and public authorities invest resources in several initiatives to promote and organize the ITS infrastructure. As a result, public policy makers, transport planners, traffic engineers, research institutes and the private sector tend to develop or use new technology approaches that support several ITS services to lessen the energy consumption, congestion, and cash needed to create new transportation infrastructure. All metropolitan cities face hold up issues particularly within the downtown areas. Normal cities will be remodelled into "smart cities" by exploiting knowledge and communication technologies (ICT). The paradigm of the Internet of Thing (IoT) can play an important role in the realization of smart cities. This paper proposes an IOT based traffic management solutions for smart cities and to coordinate with ambulance driver to find the signal status and choose the path where traffic flow will be dynamically controlled and traffic violations area unit been known by onsite traffic officers through centrally monitored or controlled through the

web. However, the theme projected is general and might be employed in any Metropolitan town while not the loss of generality. If any automobile can come back on a symbol then it'll show the inexperienced path for that automobile and remainder of ways area unit red.

2. RELATED WORKS

2.1 Review stage

As described in [1], the author has discussed paper the comparison between OSI Model, TCP/IP Model and Internet model. In Internet Model, it focuses on the Internet of Things (IoT) specific feature and issues. So in this paper, they have recommended proposing a new communication reference model so we can keep pace with the world of the Internet forever, anything. Inference Drawn is IOT means connecting data of devices via the Internet. By using IOT we are increasing the range from single traffic signal to monitoring a multiple numbers of signalling at a time. These transferring have boarded the view of handling traffic at the time of Accidents, Emergency and etc. As described in author has also listed various dynamic traffic control methods that have been implemented like Prediction Based Optimization and Fuzzy Logic. There proposed system here uses IR LED sensors along with 89 C51 AT to detect the current status of traffic and use the same data for the traffic control algorithm. This system does have a drawback that processing of signals is done within the single traffic signal. So there is no synchronization to handle the intensity with the nearby signal. This paper also contains the disadvantages of static traffic control. Using the combination of Prediction Based and Fuzzy Logic is used so that at time of Emergency, the priority will be shifted to the Lane where Emergency Vehicle do exist

2.2 Internet of Things

IoT Communication Reference Model - IOT design have combined the work on the Internet model (TCP/IP model) and its 4 layers to develop it to suit IOT Environment by keeping OSI model as a reference guide. This model can be structured in layered on top of one another with our view to forming a new model Network Interface (Physical Layer) - This is the layer comprises the aspect of physical characteristics used in communication technologies. It is similar to that of OSI. We have used DSP TM 4C 1298 NCPDT to connect across Model. This DSP processor does have in-built EMAC which direct connect the end terminal to the Internet Layer. Internet Layer (Link aspect & Network and ID aspect) – In order to address the heterogeneity of networking technologies represented within the IOT field, the Link aspect requires special attention. In fact, most networks implement similar, but customized communication schemes and security solutions. ARP is employed for mapping a network address to a physical address like an Ethernet Address. The Address Resolution Protocol may be a request and reply protocol that runs encapsulated by the line protocol. This works as Identifier which is provided using resolution functionality between locators and IDs. Transport layer (Transmission Control Protocol) – The Transmission Control Protocol provides a communication service at an intermediate level between a Web server and the Address resolution protocol. It is used to provide end to end connectivity at the Transport Layer of the Internet model. At the transport layer, the protocol handles all handshaking and transmission details and presents an abstraction of the network connection to the application. Application Layer (HTTP) - HTTP functions as a request-response protocol in the traffic signal and web server computing model. HTTP is designed to have an intermediate layer between various real-time data and server

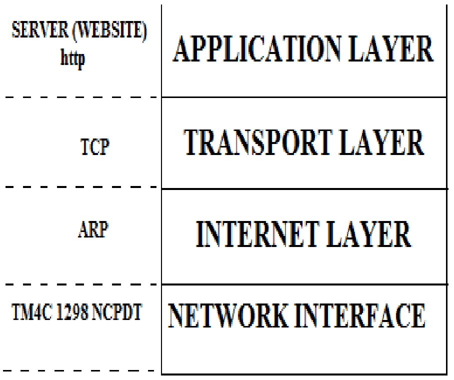

Fig. 1: IoT Communication Reference Model

3. SYSTEM ANALYSIS

3.1 System architecture

The architecture was divided into two types based on the scope of the project. They are Ambulance section.

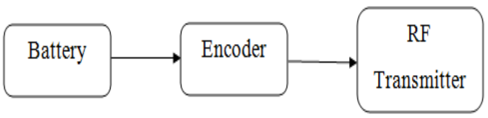

Fig. 1: Ambulance section

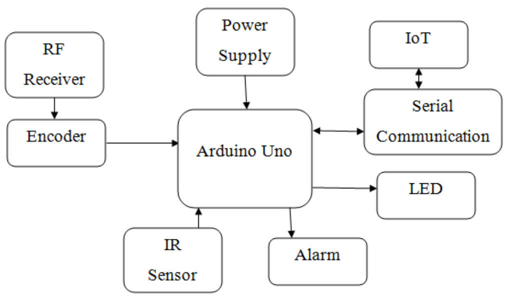

Fig. 2: Traffic signal section

3.2 Challenge Involve

- Most existing devices are expensive and sometimes larger in terms of hardware, so their installation and maintenance tend to be limited.
- We used several ITS sensors from several enterprises to gather information. These ITS sensors were not based on IoT platforms and did not use cloud approaches to produce ITS services.
- After this study, we focused our efforts to improving our last approach by incorporating a new serverless and microservice architecture**.**

3.3 Hardware required

- Arduino Uno
- Power Supply
- IoT Modem
- Serial Communication
- RF Transmitter / Receiver
- Encoder / Decoder
- IR Sensor
- Alarm

3.4 Software required

- Arduino IDE
- Language: Embedded C

4. EXISTING SYSTEM

- The traffic light is controlled manually.
- A traffic light will not change automatically during the arrival of the ambulance.
- Taking more time to reach the hospital.
- Lack of information passing.

Disadvantages

- Manual operation
- More life loss
- Take more time.

5. PROPOSED SYSTEM

- When the ambulance enters the traffic signal area, the signal is controlled automatically.
- The traffic level is monitored using an IR sensor.
- The information is transferred to server page Using IoT.

Advantage

- Automatic traffic light control.
- Anyone can see the traffic level from anywhere using IoT.
- Life loss is reduced.

5.1 RF module

- This RF module comprises an RF Transmitter and an RF Receiver.
- The transmitter/receiver pair at a frequency of 434 MHz
- An RF transmitter receives serial data and transmits it wirelessly through RF through its antenna connected at pin4.
- The transmission occurs at the rate of 1Kbps - 10Kbps. The transmitted data is received by an RF receiver operating at the same frequency as that of the transmitter.
- The encoder is used for encoding parallel data for transmission feed while reception is decoded by a decoder

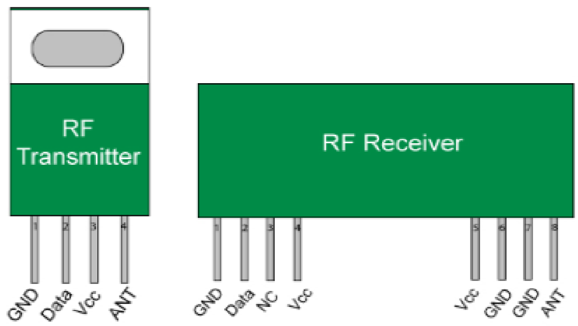

Fig. 2: RF module

5.2 Encoder

- It encodes the 12 bit parallel data into serial for transmission through an RF transmitter. These 12 bits are divided into 8 address bits and 4 data bits.
- HT12E converts the parallel inputs into serial output.
- It is mainly used in interfacing RF and infrared circuits. The chosen pair of encoder/decoder should have the same number of addresses and data format.
- HT12E has a transmission enable (TE) pin which is active low.
- As soon as TE returns to high, the encoder output completes its final cycle and then stops.

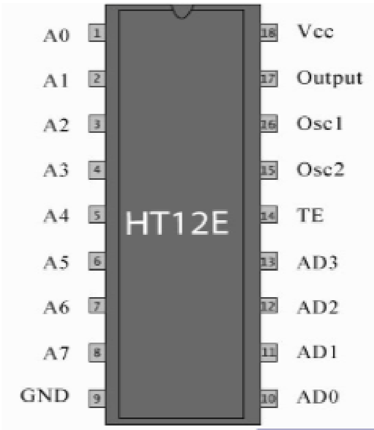

Fig. 3: Encoder

5.3 Decoder

- It is mainly provided to interface RF and infrared circuits. They are paired with 2^{12} series of encoders.
- HT12D converts the serial input into parallel outputs.
- The valid transmission should be high while receiving the data.
- It decodes the serial addresses and data received by, say, an RF receiver, into parallel data and sends them to output data pins.
- HT12D is capable of decoding 12 bits, of which 8 are address bits and 4 are data bits.

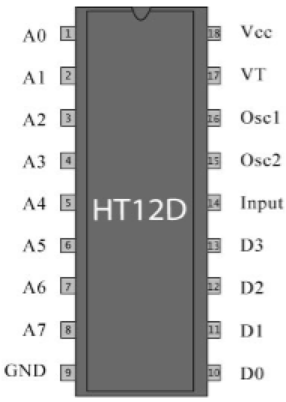

Fig. 4: Decoder

5.4 Arduino Uno

- Operating voltage : 5v
- Input voltage(recommended):7-12v
- Input voltage(limits):6-20v
- Digital I/O Pins:14(of which 6 provide PWM output)
- Analog input pins:6
- DC current per I/O pin:40mA
- DC current for 3.3v pin:50mA
- Flash memory:32Kb(Atmega328)

5.5 IR Sensor

Fig. 5: IR Sensor

- Operating Voltage: 3.0V – 5.0V
- Detection range:2cm – 30cm (Adjustable using potentiometer)
- Current Consumption: at 3.3V : ~23 mA, at 5.0V: ~43 mA
- Active output level: Outputs Low logic level when obstacle is detected
- On board Obstacle Detection LED indicator

5.6 Alarm

Fig. 6: Alarm

- Passive internal shocks without source- so if you cannot make it with a DC signal tweet. Must be a square wave 2K ~ 5K to drive it
- 2. Sound frequency control- you can make a "more than a meter hair Suola" effect.
- 3. In some special cases- you can reuse a control and LED mouth

5.7 LED

Fig. 7: LED

- Forward voltage drop: 3.2v
- Viewing angle: 15 degrees
- Max forward current: 30mA
- Luminous intensity: 5000 mCd (@20Ma)
- Lens types: water clear

5.8 IOT

Fig. 8: IOT

- Power Supply: DC +12v 1Amp.
- Auto data updating: 30sec
- Digital Output port Pins: +5V DC
- Message Format: *message or Data # (Start with * and End with #)
- Provided with 3 links
- Data updating to a specific web site
- A device controlling web site
- Data updating to a social network

6. REFERENCES

[1] UN News,"Urban and rural areas 2015", New York - USA. http://www.un.org/en/development/desa/population/publications/pdf/urbanization/urbanization-wallchart.pdf>.

[2] The Fraunhofer FOKUS Institute, "Urban life: Open-air computers", The Economist October. 2012. Available in: http://www.economist.com/news/special-report/21564998-cities-are-turning-vast-data-factories-open-air-computers>.

[3] Forbes List of most traffic affected cities in the world, 2015. http://www.forbes.com/pictures/ehmk45kigm/1-brussels-belgium-2/

[4] Monica Almeida and Noah Gilbert, "To Fight Gridlock, Los Angeles Synchronizes Every Red Light". New York Times, 2013. http://www.nytimes.com/2013/04/02/us/to-fight-gridlocklos-angeles-synchronizes-every-red-light.html?_r=0.

[5] Smart traffic Management in Amsterdam. Available in: http://amsterdamsmartcity.com/projects/detail/id/58/slug/smart-traffic-management>

[6] S. Li, L. D. Xu, and S. Zhao, "The internet of things: A survey," Information Systems Frontiers, 2014.

[7] R. M. Cardoso, N. Mastelari, and M. F. Bassora, "Internet of things architecture in the context of intelligent transportation systems–a case study towards a web-based application deployment," presented at 22nd International Congress of Mechanical Engineering (COBEM 2013), 2013.

[8] A. McEwen and H. Cassimally, "Designing the Internet of Things", John Wiley & Sons, 2013.

[9] S. Mohammadi, A. Rajabi, and M. Tavassoli, "Controlling of traffic lights using RFID technology and neural network," Advanced Materials Research, vol. 433, pp. 740-745, 2012.

[10] J. Paul et al., "RFID based vehicular networks for smart cities," presented at 2013 IEEE 29th International Conference on Data Engineering Workshops (ICDEW), 2013.

[11] T. Zhou, L. Gao, and D. Ni, "Road traffic prediction by incorporating online information," in Proc. the Companion Publication of the 23rd International Conference on World Wide Web Companion 2014, pp. 1235-1240, 2014.

[12] Zongtao Duan, Ying Li, Xibin Zheng, Yan Liu, Jiting Dai, Jun Kang. Traffic Information Computing Platform for Big Data, AIP Conference Proceedings, 2014, 1618(1):464-467.

[13] C. Dobre, F. Xhafa. Intelligent services for Big Data science. Future Generation Computer Systems 37 (2014) 267–281.

[14] Jin Peng Tang, Ling Lin Li. Big Data Sensing Information Processing Platform for Intelligent Traffic. Applied Mechanics and Materials.2014,667:324-327

[15] M. Muehlenbrock, O. Brdiczka, D. Snowdon, And J.L. Meunier (2004). Learning to Detect User Activity and Availability from a Variety of Sensor Data. IEEE International Conference on Pervasive Computing and Communications (PerCom "04). p. 13-23.

[16] Nils J. Nilsson, "Artificial Intelligence– A New Synthesis", Harcourt Asia Pvt. Ltd., 2003.

[17] Ch. Le Gal, J. Martin, A. Lux, And J.L. Crowley (2001). SmartOffice: Design of an Intelligent Environment. IEEE Intelligent Systems. 16(4), p. 60-66.

[18] Witten I. & Frank E., 2010 Data Mining: Practical Machine Learning Tools and Techniques with Java Implementations, Morgan Kaufmann, San Mateo.

