



## IMPLEMENTATION OF UNCONSCIOUS BUS LOCATION SENSING SYSTEM WITH SMARTPHONE DEVICES AND BLUETOOTH MODULE

Engineering

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### ABSTRACT

The unconscious bus location sensing system is implemented using bluetooth technology. It demonstrates a new unconscious sensing system for bus location. This system is a new type of application based on participatory sensing systems. However, it can perform sensing operation with user's operation. Therefore, it can employ the mechanism to realize practical application such as bus location systems. This sensing system consists of a bluetooth device and a smartphone application. The bluetooth device is installed on a bus to activate the smartphone application. The smartphone application can upload a bus location when it detects the bluetooth device. The demonstration shows a prototype system for a bus location system based on the new participatory sensing mechanism. Many developments have recently made noticeable changes in several domains. This system will allow half blinded people to safely catch buses with the help of smartphone device and a tactile interface through a wireless communication system between the transmitter and the receiver. They will know the opportunity to get information about bus arrival and departure time as well as assist the bus operator to know the presence of half blinded people on the road. The motivation behind is that buses are vital in enabling half blind people to participate fully in society, access to facilities and services.

### KEYWORDS:

Bluetooth, half blinded, smatphone, sensing

### INTRODUCTION

Wireless communication, or sometimes simply wireless, is the transfer of information or power between two or more points that are not connected by an electrical conductor. The most common wireless technologies use radio waves. With radio waves distances, can be short, such as a few meters for television or as far as thousands or even millions of kilometers for deep-space radio communications. The proposed model demonstrates a new bus location sensing system that employs an unconscious participatory sensing method. The unconscious bus location sensing system consists of three functions Bluetooth devices for triggering a special smartphone application, the smartphone application for location sensing and location sharing, and cloud service for management and distributing uploaded location information. The benefit of the system is that a bus company can collect bus location by using passenger's smartphone when passengers install the sharing application for a bus location. Additionally, the system can reduce consumed power for bus location sensing by using Bluetooth technologies. Therefore, the proposed system can solve two big issues in participatory sensing, difficulty to install a special application in participant's smartphone and increasing of consumed power for sensing in a background process.

The bluetooth device is configured beforehand and installed on each bus. Therefore, it also broadcast a bluetooth message periodically. The smartphone application obtains the information about bluetooth devices from the cloud service. The application registers the informed UUID to the OS system. Then, the status of the application will move to suspend status. The OS system starts the application in the background process when it detects the bluetooth message including the registered UUID. The application measures the smartphone location. The application also supports the location sharing function. Therefore, it requests the bus location on the dedicated route application, and web service. The demonstration shows that the system can collect location information with passenger's operation, and can confirm the shared bus location on the map.

### LITERATURE SURVEY

**Evgeny Stankevich et.al** [1] gives one of the most important device is mobile phone. For now, it is a powerful computing platform equipped with various sensors. Embedded sensors can be used in multiple domains, such as environmental monitoring, social networks, safety and healthcare. Thus the survey of main use cases of mobile phone sensors in mobile healthcare.

**Tim Kaler et.al** [2] states the Modern smart phones are equipped with a wide variety of sensors including GPS, Wi-Fi and cellular radios capable of positioning, accelerometers, magnetic compasses and gyroscopes, light and proximity sensors, and cameras. These sensors have made smartphone an attractive platform for collaborative sensing applications where phones cooperatively collect sensor data to perform various tasks.

**Snehal D. Nanhore et.al**[3] gives one of the most important device in their lives is a mobile phone. For now, it is a powerful computing platform equipped with various sensors. Embedded sensors can be used in multiple domains, such as environmental monitoring, social networks, safety and healthcare. Sensor enabled mobile phones or smart phones are hovering to be at the center of a next revolution in social networks, green applications, global environmental monitoring, personal and community healthcare, sensor augmented gaming, virtual reality and smart transportation systems.

**Nicholas D. Lane et.al** [4] states the mobile phones or smart phones are rapidly becoming the central computer and communication device in people's lives. Application delivery channels such as the apple app store are transforming mobile phones into app phones, capable of downloading a myriad of applications in an instant. Importantly, today's smartphone are programmable and come with a growing set of cheap powerful embedded sensors, such as an accelerometer, digital compass, gyroscope, GPS, microphone, and camera, which are enabling the emergence of personal, group, and community scale sensing applications.

**Hon Chu et.al** [5] They intend to develop a smart phone app that can tell whether its user is a driver or a passenger in an automobile. While the core problem can be solved relatively easily with special installations in new high-end vehicles (e.g., NFC), constraints of backward compatibility makes the problem far more challenging.

**Zhouchi Li et.al** [6] states that beacon, a novel beacon device aiming at proximity estimation was introduced in 2014 by apple inc. based on bluetooth low energy (BLE) technology. The beacon is utilized in their work to establish an in-room newborns localization system in hospitals. Since beacon can broadcast beacon signal every certain interval, they can adopt beacon instead of RFID for baby tracking.

**John D. Heilbrunn et.al**[7] The blind community depends on sighted people for a significant amount of information and

assistance. sponsored by the Danish association of the blind, explored the ability of beacon technology to assist blind people while navigating indoors. Pilot testing discovered that the current beacon system, coupled with only the necessary bluetooth technology, presents significant obstacles for use. Interviews with industry experts revealed that the weaknesses have been overcome internationally by blending bluetooth with other technologies. They concluded that beacons have great potential as an assistive tool for blind people, but the system they tested needs significant improvements.

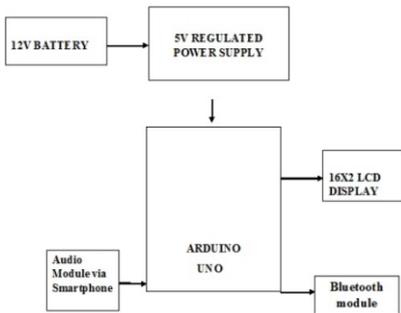
**Leon Floyd Anderson et.al [8]** The U.S. Federal communications commission (FCC) made it mandatory for all wireless communications services, such as mobile phones, to be equipped with automatic location identification (ALI) capability. This required that all public safety answering point (PSAP) attendants who answer a 911 call from a cellular phone can locate the caller to a specified degree of accuracy. This requirement was the impetus that led to momentous technological activity to provide means to geo-locate wireless phone calls.

**Shantanu Agrawal et.al [9]** Many developments have recently made noticeable changes in several domains. Shedding the light on the field of transportation to improve the life quality of visually impaired persons (VIPs) using some of these technologies such as radio frequency module. The idea behind this paper is to develop a prototype that would use the technological advancements to assist the daily computers, especially visual impaired person to access public transport.

**Takamasa Mizukami et.al [10]** proposes a beacon device based unconscious participatory sensing system consisting of beacon devices, smartphone devices, and management servers. Beacon devices installed at measurement locations find a neighbor smartphone device to request to relay measurement information to a management server or to request measurement with built-in sensors. The proposed processes can be carried out without participator's interaction behavior.

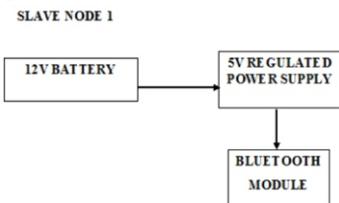
**BLOCKDIAGRAM**

Bluetooth based navigation system is implemented for the indoor application. Arduino Uno is a microcontroller board based on the ATmega328P. It has 14 digital input/output pins, 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery.



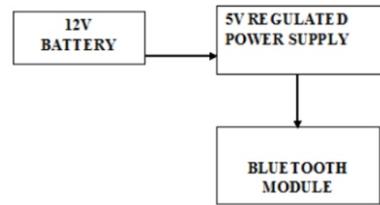
**Fig 1 Master Node**

**SLAVENODE 1**



**Fig 2 Slave Node 1**

**SLAVE NODE 2**

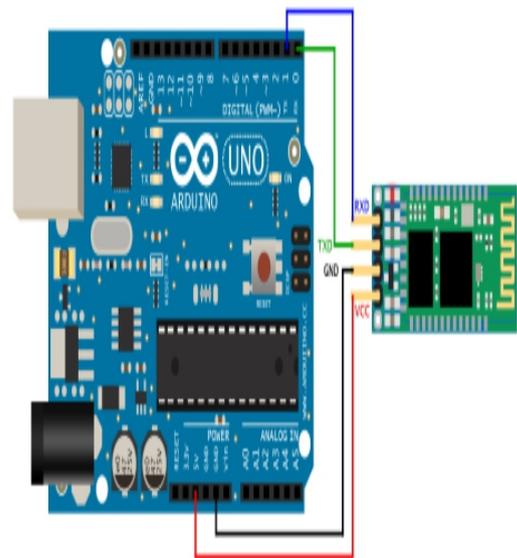


**Fig 3 Slave Node 2**

Here two slave section and one master section is used. The slave module is sending the data of location and master node received the nearby location and device by scanning and details are explained via mp3 audio player. So, this project navigation the half-blinded people in anywhere and anyplace.

**EXPERIMENTAL RESULT**

**STEP 1: Interfacing of Arduino with Bluetooth module.** C 05 works on serial communication. The android app is designed to send serial data to the arduino bluetooth module when a button is pressed on the app.



**Fig 4. Bluetooth interfacing**

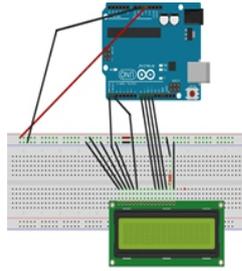
The arduino bluetooth module at other end receives the data and sends it to the arduino through the TX pin of the bluetooth module (connected to RX pin of Arduino).

The code uploaded to the arduino checks the received data and compares it. The circuit is so simple and small; there is only few connections to be made which are as follows,

Arduino Pins	Bluetooth Pins
RX (Pin 0)	TX
TX (Pin 1)	RX
5V	VCC
GND	GND

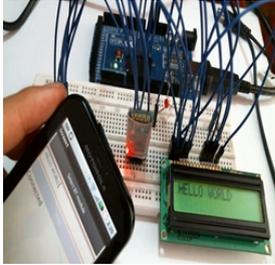
**STEP 2: Interfacing of Arduino with LCD.**

In the circuit, you can observe there are only two control pins, this gives the flexibility. The contrast bit and READ/WRITE are not often used so they can be shorted to ground. This puts LCD in highest contrast and read mode. We just need to control ENABLE and RS pins to send characters and data accordingly.

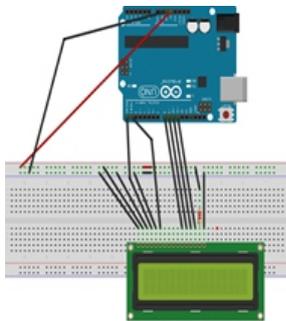


**Fig 5 LCD interfacing**

The connections which are done for LCD are given below:



- PIN1 or VSS to ground
- PIN2 or VDD or VCC to +5v power
- PIN3 or VEE to ground (gives smaximum contrast best for a beginner)
- PIN4 or RS (Register Selection) to PIN0 of ARDUINO UNO
- PIN5 or RW (Read/Write) to ground (puts LCD in read mode eases the communication for user)
- PIN6 or E (Enable) to PIN1 of ARDUINO UNO
- PIN11 or D4 to PIN8 of ARDUINO UNO



- PIN12 or D5 to PIN9 of ARDUINO UNO
- PIN13 or D6 to PIN10 of ARDUINO UNO
- PIN14 or D7 to PIN11 of ARDUINO UNO

### STEP 3: Assembling of all Components with Arduino.

Bluetooth module is used to create a connection between Arduino Uno and an android app. Arduino listens for commands to share the bus location. In addition, they can also type the place or through voice note makes a status report that is been sent to the app. The connection between arduino and the android phone is a slave module.

To make things very simple, there are two types of devices: master and slave; a master can communicate with more than one slave while a slave can communicate with a single master at a time.

### Fig 6. Output display

### CONCLUSION

The new bus location sensing system employs the unconscious participatory sensing with user's participation. The demonstration shows that the system can collect location information with passenger's operation and can confirm the shared bus location on the

map. Overall, the final demonstration includes a digital schedule bus stop, a transit web service, and a smartphone application. In Future, beacon based tracking system can be implemented for indoor application. Beacon is a module which generates the signal called as beacon; that signal is broadcasted to the entire surrounding place. So, the master broadcasts the scanning signals to find the nearby slave device. If any slave device is present in range the master track the slave based upon the RSSI value of the slave device. The system consists of a beacon device on a bus, an application on participant's devices and a cloud service. The beacon device can trigger the application on participant's devices on the bus. Therefore, the application can execute its process in the background even if it is suspended due to the power control mechanism on smart phone OSs. Thus, the system can realize the sensing operation without participant's operation and can reduce power consumption by triggering a suspended application.

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