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Smart Walking Cane for Visually Impaired Pedestrian

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Abstract - *One of the biggest problems faced by the visually impaired is navigating from place to place. The adverse conditions of the roads make it even more difficult for them to walk outdoors. They have to be alert at all times to avoid consequences like colliding with stable or moving obstacles, ascending or descending staircases, slipping down wet terrain. Also, at times they may be in distress and might want to send an alert message to their relatives or friends about their whereabouts. These problems of blind people can be addressed with the intervention of technology. The proposed solution employs the Internet of Things (IoT) paradigm to provide a medium between the blind and the environment. Several sensors can be used to detect anomalies like obstacles, staircases and wet terrains respectively. The prototype discussed here is a simple, sophisticated and affordable smart blind stick equipped with various IoT sensors and modules. Also, this solution provides a way to send a message about the whereabouts of the user to the concerned people. A software application is designed to help the acquaintances of the blind to manage the stick's configuration ex: add or delete phone numbers to which alert messages have to be sent. Misplacing the stick indoors can also be a substantial issue.*

Key Words: **IoT, Anamolies, Sensor, Stick, Consequences**

1. INTRODUCTION

According to the World Health Organization, there are nearly 285 million people with some form of visual impairment out of which 86% people have low vision and 14% people are blind. Vision is one of the most important sense to humans to survive. Vision helps to connect with the surroundings. People deprived of vision rely on other dependencies like a simple walking cane or other people. In familiar places like the interiors of a house, they memorize the site directions, obstacles on their way and navigate according to them. However, it is not always safe for the blind to rely on their memory to move from one place to another. Especially when they are out-doors. Not all the times blind people are offered help from others and hence there is a need for a device, such as a stick, which can assist the visually impaired people in all forms of life. Transceivers and all the associated components are connected to Ardino Micro controller. Disabled person will be assisted with a vibration in the blind stick when they come in contact with a traffic signal. The button associated with the cane when pressed will displays an additional red light along with the red stop symbol. The blind stick is also provided with battery and is supported with a rechargeable port. Hence they are rechargeable.

1.1 Location Identification

The blind person will be notified when they are close to public places. Transceivers are used to communicate between the blind stick and traffic signal. The signal will initiate a vibration notifying the place of location. each traffic signals are supported with different frequencies so that we can differentiate the signals from different transceivers. The same setup can be installed in mall, hospital, school etc

1.2 Indication to the Public

An additional red light is displayed when the blind person press a button in order to cross the road. The red light is associated with the regular red stop symbol. This additional light is provided to give a public attention. People in the traffic will be notified with the extra light symbol.

2. SYSTEM DESIGN

System consists of transceiver, led, push button, ultrasonic sensor, regulator IC, BMS module, vibrating module and a rechargeable port. Wireless Communication is the algorithm that we use in this design. To meet this wireless technique transceivers are used to establish the connection. Arduino is the microcontroller used here. Arduuino Mini is implemented in the stick in order to occupy within the small radius.

2.1 EXISTING SYSTEM

Existing systems like canes can guide blind people by helping them detect the obstacles in their path through touching/poking. Alternative to the above method some other aids include smart belts, smart rings, smart canes etc., which can assist them by detecting obstacles using ultrasonic or laser sensors. These systems produce either an audio or vibration in response w.r.t the detected obstacles to warn them.

The limitations of existing systems are as follows: Expensive , Not very effective and reliable ,Have very limited features and usability.

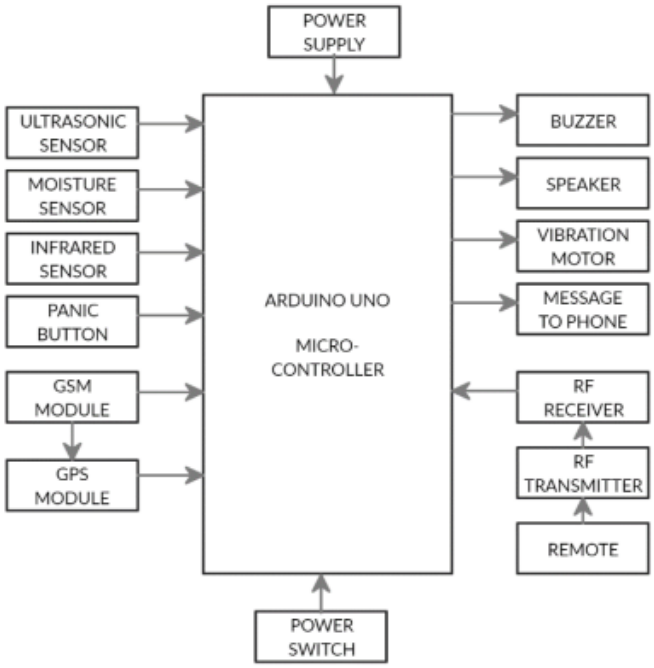

Fig -1: Block Diagram of Existing System

2.2 PROPOSED SYSTEM

In this model we are using wireless communication strategy. We use Transceiver to establish a connection between traffic signal and blind stick. Each transceiver in the traffic signal is subjected with a particular frequency in the RF range (2.4 – 2.5GHz) in order to distinguish it from neighbouring transceivers. Whenever a **Smart Walking cane** is observed near a traffic light, the transceiver within the traffic signal sends a frequency to the walking cane thereby creating a vibration in it. This vibration is of a fixed pattern, and the pattern of vibration varies for signals from Malls, ATM and so on. With the help of this varying vibration, the blind will be able to distinguish his position.

In addition to transceiver we are providing a button to the cane, which is used by the blind person to notify the presence of him/her at the traffic signal. When button is pressed there displays an additional light , when the signal changes to red.

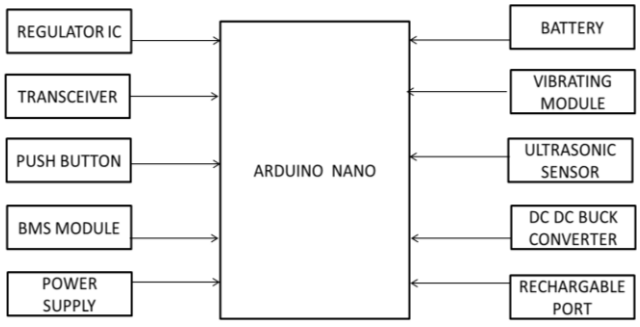

Fig -2: Block Diagram of Proposed System-blind Stick

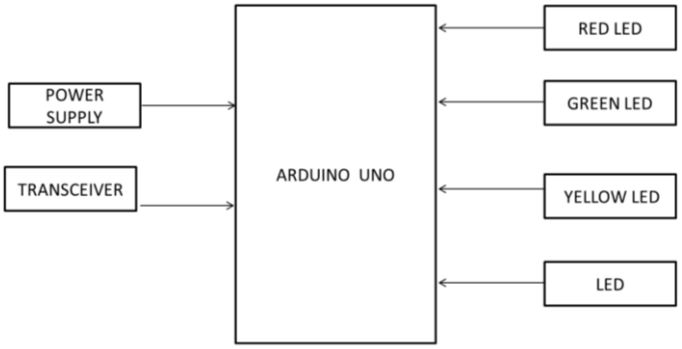

Fig-3: Block Diagram of Proposed System- Traffic Light

2.3 RESULTS

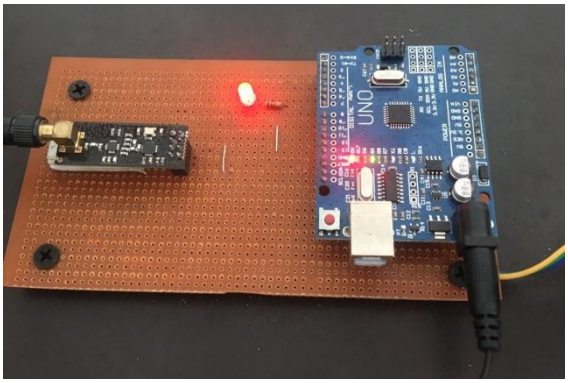

Fig -4: display of red light when button is pressed

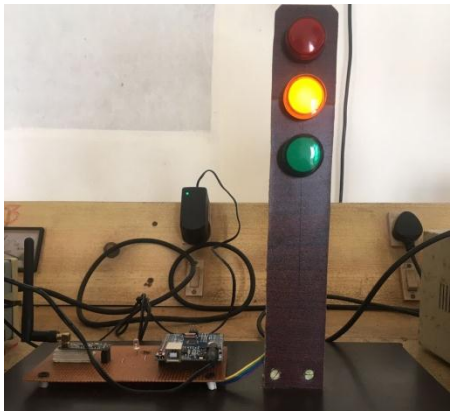

Fig -5: Setup of the System

3. CONCLUSIONS

The blind stick proposed in this paper can aid the visually impaired user by helping him/her navigate through different terrains and obstacles. The stick is also able to inform the user's location to their caretakers in case of an emergency or distress. Also, the stick has the capability to be located using a RF remote control. This can be further enhanced by adding small scale and high performing sensors thus improving the design and reducing the space being occupied on the stick.

Few improvements can be made to the sensor angle placement to make them adjust according to the angle of the stick w.r.t to the ground so that they always point straight instead of mounting them at a static angle.

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