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MEDICAL EQUIPMENT MANAGEMENT AND TRACKING SYSTEM USING IOT AND WSN

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Abstract---Small sized devices with communication capability are accepted in real applications recent years and the applications increase business efficiency. We developed an asset tracking application using a wireless sensor network. The application consists of three Components: a wireless sensor network, a middleware, and a IoT user interface. The sensor network consists of mobile nodes, reference nodes, and one gateway. Each mobile node equipped with a location sensor is attached to one medical asset so that the application tracks medical assets. The middleware abstracts the specification of the sensor network. The graphical user interface is developed according to the requirements of nurses and doctors. The application shortens the searching time for mobile medical assets from about twenty minutes to within 20 seconds. By shortening the searching time of the assets, the nurses can use more times to take care of patients and the patients can receive better medical services. Low- level functionality of the TRACKING system is unlike that of typical Radio-frequency identification (RFID) technologies. The spirit of the IoT paradigm employed by TRACKING makes the system both flexible and scalable, by leveraging collaboration between embedded and cloud systems. This flexibility will allow for the future support of additional applications such as hardware integration (e.g., New hardware components).This can include data acquisition such as usage statistics and historical patient health data. Compiling this data might pave the way for future research into disease vectors or could be used to optimize care delivered for specific conditions. While implications for an IoT system such as TRACKING are wide-ranging; its primary objective is to provide an easy to use, low-cost solution to track the location of medical assets in real-time. Saves life at emergency situation by reducing the time taken to find an equipment.

Keywords- current sensor, step down transformer, bride rectifier, regulator etc…

I. INTRODUCTION

Hospitals and medical centers have been integrating technology in all aspects of medical field to improve the quality of service and efficiency .Obtaining an accurate and reliable record of patients, staff, and asset flows has historically been challenge in the health care industry. Human error, misuse, and/or abuse are just a few of the issues that are inherent in traditional methods of resource management in health care centers. To address this challenge some health care centers have begun to adopt real-Time Locating Systems (RTLS) to gain the upper hand in asset management [1]-[2]. RTLS can provide users with both historic a land real-time data. This information can be used to locate assets and can also be used as an analysis tool for process improvement. Unfortunately, there are several constraints (technical, monetary, social/legal) that are particularly obstructive to the adoption of new technologies in the health care industry [1]. For this reason, the goal of the Localization of Health Center Assets Through an IoT. The usage of wireless devices for the application of daily lives activities have been rapidly gaining attention in themo dernization of a system. The propagation of signal has been catered for the elimination of wired or corded devices in order to simplify and minimize the hardware implementation making it more accessible and easier to apply, especially in an indoor environment where the application of wireless devices are variegated depending on its surrounding in which numerous objects may scatter, diffract, reflect and absorb radiation [1].The situations become more variegated as more variables are changing positions continuously such as moving people and other devices that are carried inside the area which transmits signal in the same frequency as the main transmitter such as stationary both in space and time domains [1].

This leads to a more subjugated study and profiling in the signal propagation study of a device and its surroundings in order to allow a stable efficient signal wave propagation making the ability to predict the behavior of signals in indoor environments more crucial. When a signal propagates from a single transmitter to receiver, the mechanism of the signal transmission needs to be considered as a factor that may affect the signal transmission efficiency. This needs to be considered as a major aspect whenever there are other things that are in between the transmitter and the receiver or in the channel. As such, channel measurement is important for understanding signal propagation. Many researchers have measured various channels for almost similar purposes, which involve both indoor and outdoor channels. Some of the measurement performed previously includes , In this paper, we describe the measurement performed on 5 different paths in an indoor environment by using wireless devices.

II. COMPONENTS FOR IMPLEMENTATION

A) Current sensor

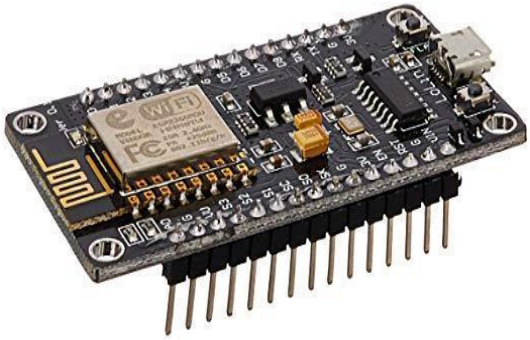
A current sensor is a device that detects electric current in a wire, and generates a signal proportional to that current. The generated signal could be analog voltage or current or even a digital output. The generated signal can be then used to display the measured current in an ammeter, or can be stored for further analysis in a data acquisition system, or can be used for the purpose of control.

B*) Voltage Regulator*

Voltage regulator , any electrical or electronic device that maintains the voltage of a power source within acceptable limits. The voltage regulator is needed to keep voltages within the prescribed range that can be tolerated by the electrical equipment using that voltage. Such a device is widely used in motor vehicles of all types to match the output voltage of the generator to the electrical load and to the charging requirements of the battery.

C) *NODE MCU*

As Arduino.cc began developing new MCU boards based on non-AVR processors like the ARM/SAM MCU and used in the Arduino Due, they needed to modify the Arduino IDE so that it would be relatively easy to change the IDE to support alternate toolchains to allow Arduino C/C++ to be compiled for these new processors. They did this with the introduction of the Board Manager and the SAM Core.



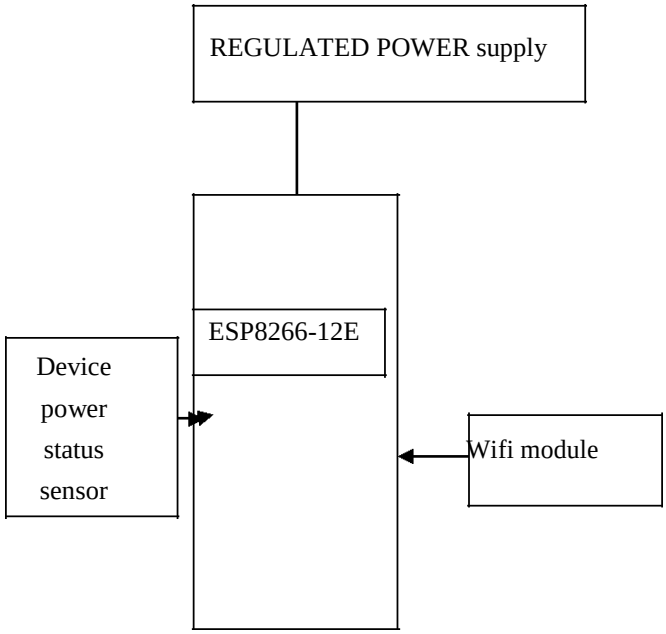
A "core" is the collection of software components required by the Board Manager and the Arduino IDE to compile an Arduino C/C++ source file for the target MCU's machine language. Some ESP8266 enthusiasts developed an Arduino core for the ESP8266 WiFi SoC, popularly called the "ESP8266 Core for the Arduino IDE".[16] This has become a leading software development platform for the various ESP8266-based modules and development boards, including NodeMCUs.

D) Step Down Transformer

A Transformer is a static apparatus, with no moving parts, which transforms electrical power from one circuit to another with changes in voltage and current and no change in frequency. There are two types of transformers classified by their function: Step up Transformer and Step down Transformer.A Step up Transformer is a device which converts the low primary voltage to a high secondary voltage i.e. it steps up the input voltage. A Step down Transformer on the other hand, steps down the input voltage i.e. the secondary voltage is less than the primary voltage. A Step down Transformer is a type of transformer, which converts a high voltage at the primary side to a low voltage at the secondary side.

II. EXPERIMENTAL SETUP

This experiment was carried by using a pair of transmitter and receiver. Tracking system integrates WiFi signals (802.11), wireless networking, embedded systems, and cloud computing platforms to implement an IoT centric solution for a RTLS in health care environment. The design of this tracking system has three main parts : 1 euipment module. 2.ward module. 3.IOT module.



During the whole experiment, the equipment allocation and placement are kept fixed . Mean while, the number of people inside the office during the experiment were kept fixed and minimum as only the person in charge of reading the signal strength and another one as the person allocated to moving the transmitter inside equipment moule. Selection of this location also may lead to a huge contribution to the development of my own wireless asset tracking system in the future. The step down transformer is 230v but we need to control the volt as 12v by the help of bride rectifier and also regulator decreses the power voltage for the micro controller .MCU8677 has wifi module for connecting device unit .it has two mcu for each wards .frist mcu transmitter connected to the mcu 2 reciver.mcu 2 transmitter connected to the reciver . A wireless sensor network and IoT based monitoring system is proposed in this project. Each equipment and ward acts as a wireless node. A central controller is used to interface the details to a computer where the data will be available for easy reference..

III. HARDWARE CONNECTIONS

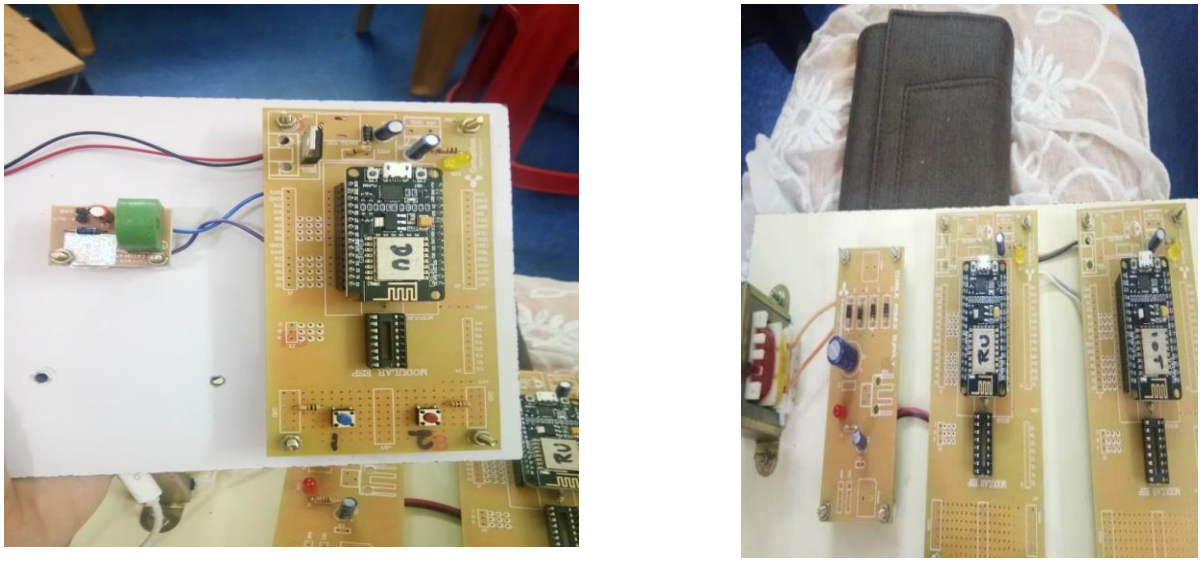


Fig.4- equipment module

IV.TOOLS

A) SOFTWARE TOOLS

Development - PC with Windows 7 OS, TargetDevice-ESP8266-12E,CVariant-Embedded 'C' IDE–Arduino, IDE, Compiler-AVR-gcc,PCApplicationVB .NET using MS Visual Studio

B) HARDWARE TOOLS

1. ProgrammeR-Inbuilt ICSP Programmer Osilloscope- Tektronix DSO, Soldering IronSoldron 25W,Multimeter - Mastech Digital Multimeter

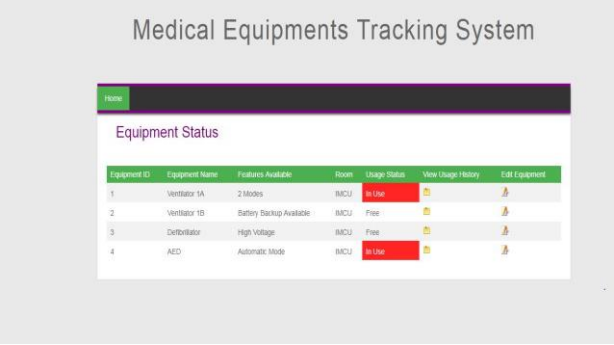
C) OBJECTIVE

TO track and monitor medical equipments and assets in a hospitals so as to prevent unnecessary panic during emergency situation, by tracking the location and status of each medical equipment present at the tracking.

V. RESULT AND ANALYSIS

The existing system to track and monitor medical equipments are purely based on manual registering and entry either in an paper based register or a computer. Applying this project for hospitals,Health care centres,Industries http://contraptions.in/projects/sr18172_i ot_medical_asset_tracking/app.php

OUTPUT DISPLAY



VI. FUTURE ENHANCEMENT:

This project focuses on a real-time pervasive healthcare monitoring system using IoT and cloud computing service which are more beneficial for elders and chronic diseases' patients. The current methods available for realization of Healthcare services are surveyed and the challenges that are part of realization are also highlighted. This paper proposes an intelligent real-time patient monitoring system that monitors the subject's vital parameters such as temperature, pressure, fall detection, breath activity and ECG through PHD prototype model as well as detects any abnormality accurately.

Appropriate medications are suggested based on the diagnosis of the provided set of symptoms. The system sends an alert message to the caretakers and doctors in case of any abnormality through WBAN. The system enables the clinicians to optimize the usage of available medical resources and minimize the costs in monitoring the patients. In the future, we will focus on improving wearing sensor experience by using softer materials and enabling controlled sharing of information among the doctors, the patient, and the patients' family through social networking paradigm.

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