DEPARTMENT OF
ELECTRONICS AND COMMUNICATION ENGINEERING

Faculty of Engineering and Technology, SRMIST

DESIGN PROJECT SUMMARY FORM

Project Title : **Smart IoT Enabled Intelligent - Health Medicine Device**

Supervisor/Guide : **Mrs.V.Padmajothi**
Assistant Professor (Sr.G)
Electronics and Communication Department

Team Members : **1. Prateek Srivastava(RA1511004010721)**
2. Arpana Arland(RA1511004010706)
3. Nitin Asthana(RA1511004010717)
4.Sushant Kumar(RA1511004010713)

Background/Literature Review:

References:

1. ‘ ’ An IoT-Aware Architecture for Smart Healthcare Systems’ ’ , Luca Catarinucci, Danilo De Donno, Luca Mainetti, IEEE Internet of Things Journal, Nov 2015.
2. ‘ ’ A Health-IoT Platform Based on the Integration of Intelligent Packaging, Unobtrusive Bio-Sensor and Intelligent Medicine Box’ ’ , Geng Yang, Li Xie, Matti Mäntysalo, Xiaolin Zhou, IEEE Transactions on Industrial Informatics, Nov 2014.
3. ‘ ’ An Electronic Pillbox for Continuous Monitoring of Medication Adherence’ ’ , Tamara. L. Hayes John, M. Hunt, Andre Adami, and Jeffrey A. Kaye, IEEE Engineering in Medicine and Biology Society, October 2012.
4. ‘ ’ Reconfigurable Smart Factory for Drug Packing in Healthcare Industry 4.0’ ’ , Jiafu Wan, Shenglong Tang, Di Li, Muhammad Imran, Chunhua Zhang, Chengliang Liu, Zhibo Pang, IEEE Transactions on Industrial Informatics Oct 2018.
5. ‘ ’ Effective ways to use Internet of Things in the field of medical and smart health care’ ’ , Kaleem Ullah; Munam Ali Shah; Sijing Zhang, IEEE Xplore 23 May 2016.

Objective:

Establishment of a safe and secure Health Medicine Device that will keep track of real time information of the patient’ s medicine schedule and also will inform the hospital in case of any emergency regarding patient health.

Requirements:

1) Arduino Mega
2) Wi-Fi module
3) Ultrasonic sensor
4) IR sensor
5) RTC module

Technical Requirements:

Engineering standards and realistic constraints in these areas:

Area	Codes & Standards / Realistic Constraints
Economic	Targeted to maximum expense of Rs 8,000/.
Environmental	This project is not expected to entail any particular environmental consequences.
Social	This project provides physiological aids and self actualization.
Ethical	This project does not entail ethical constraints.
Health and Safety	This project ensures to help maintain regular medication and is safe as well.
Manufacturability	This project can be manufactured efficiently, reliably and within acceptable cost. It can be easily redesigned.
Sustainability	The resources used in this project (microcontroller, sensors, LCDs, motors) are essentially non-recoverable.

Realistic Constraints:

1) Since the ultrasonic sensor on opening the box measures inaccurate reading because of its position, we' re trying to correct it' s reading in coding simulation such that it takes reading only when the box is closed.
2) It is assumed that whenever a hand is placed inside the box, only 1 pill has been taken out for sure.
3) Lifespan of sensors is less and hence may require replacement incase, wrong timing is updated in code, it will indicate to take medication at wrong time.
4) It needs constant power supply to work.

Standards Referred/used:

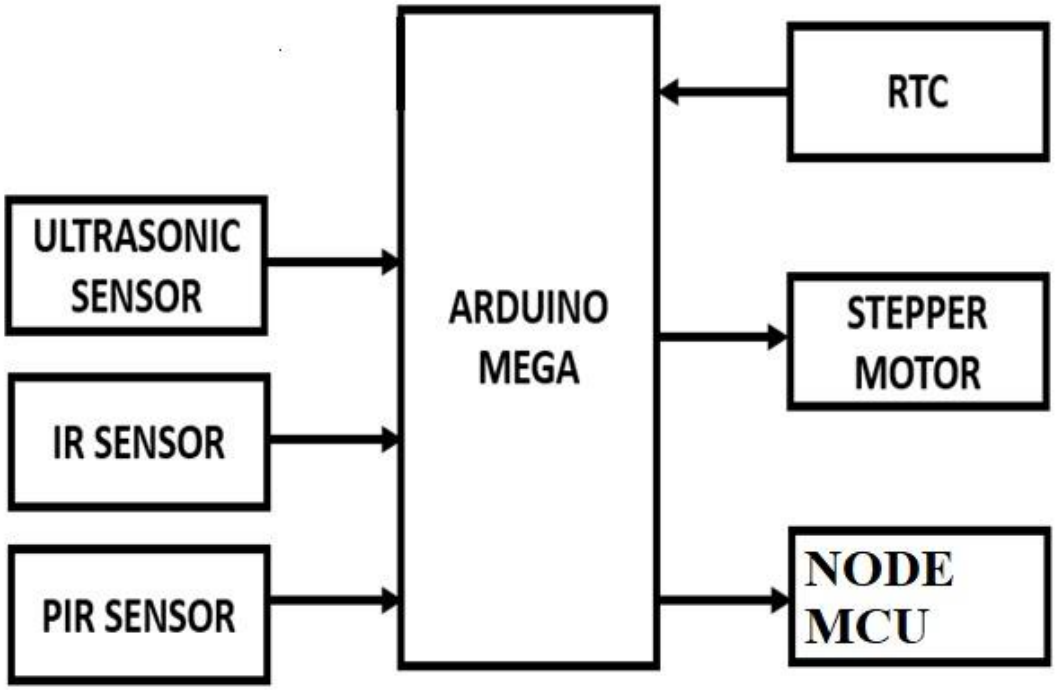
IEEE standards for Wi-Fi : 802.11
IEEE standards for RFID : 802.15.4

Abstract:

It is helpful to people who are forgetful about taking medicine in proper time, especially the elderly people. It can be used by nurses as well to avoid confusion in medication of patients. The time required to take medicine isn' t printed on medicine box or can' t be read by people .

Sometimes they forget to take pills. This project deals with particular time a patient needs to take pills which can be changed according to his requirement. It even ensures that right medicine at appropriate time is taken , moreover it monitors the number of pills left, if few , order of pill is sent by system to medical shop automatically through GSM.

Block Diagram:



Additional Requirements:

- Arduino IDE
- Arduino c

Multidisciplinary Tasks:

1) Electronics and Communication Engineering for IoT and NodeMcU.
2) Electrical Engineering for wires and Arduino Mega.
3) Instrumentation and Control Engineering for Ultrasonic and IR sensor.
4) Mechanical Engineering for servo motors.
5) Desktop publication for report.

Results:

The Smart medicine box is used to maintain the regularity of taking medicine and due to this patient can complete course of medicine easily. The project consists of three smart boxes. After the time for taking the medicine is set, the box opens on that particular time and the indication for taking the medicine is given using LED. We design the box in such a way that continuous monitoring on the count of the pills is done and a message is send to the user before the box gets emptied. The algorithm was translated to arduino c code, and we optimized our

implementation to reduce computation time. The whole data of the medicine box is stored on ubidots website and can be access by the user or care taker. For the future use, it would be nice to have one central medicine box website and the numbers of pins of NodeMCU should be increase so that more boxes can be connected to it.

Discussion:

This project was given to 5 elderly people. 3 out of 5 found it to be useful and convenient. The medicine box kept reminding individual to take medicine at correct time. They could complete their medication course without fail. Whereas 2 out of 5 found it difficult to use. The box was not portable for every site. Sometimes they could not hear the buzzing of sensor to take medicine. They were unable to get constant power supply for the box.

Conclusion:

Older people experience several practical problems using their medicines, and their strategies to manage these problems are sometimes suboptimal. These problems can lead to incorrect medication use with clinically relevant consequences. The findings pose a challenge for healthcare professionals, drug developers, and regulators to diminish these problems. The correct and timely use of medication determines its therapeutic effect, yet several steps are involved in taking medicines as recommended, such as reading and understanding the user information, opening and removing the medicine from the outer and inner packaging, any preparation before use, and taking the medicine. This project aimed to resolve the practical problems that older people experience with the daily use of their medicines and their management strategies to address these problems and to determine the potential clinical relevance thereof.

ABET Design Project Summary

Project Title	Objective of the Project	Realistic constraints imposed	Standards to be referred/followed	Multidisciplinary tasks involved
Smart IoT Enabled Intelligent - Health Medicine Device	Establishment of a safe and secure Health Medicine Device that will keep track of real time information of the patient' s medicine schedule and also will inform the hospital in case of any emergency regarding patient health	1) Since the ultrasonic sensor on opening the box measures inaccurate reading because of its position, we' re trying to correct it' s reading in coding simulation such that it takes reading only when the box is closed. 2) It is assumed that whenever a	1.IEEE standards for Wi-Fi : 802.11 2.IEEE standards for RFID : 802.15.4	1) Electronics and Communication Engineering for IoT and NodeMcU. 2) Electrical Engineering for wires and Arduino Mega. 3)Instrumentation and Control Engineering for Ultrasonic and IR sensor. 4) Mechanical

		hand is placed inside the box, only 1 pill has been taken out for sure. 3) Lifespan of sensors is less and hence may require replacement In case, wrong timing is updated in code, it will indicate to take medication at wrong time. 4) It needs constant power supply to work.		Engineering for servo motors. 5) Desktop publication for report.

Team members' role and responsibilities

ARPANA ARLAND (RA1511004010706)

- Did hardware setup
- Finalized presentation
- Wrote project paper for publication
- Did report work

SUSHANT KUMAR (RA1511004010713)

- Made presentation
- Did report work
- Applied for conference in different universities
- Made ABET form

NITIN ASTHANA (RA1511004010717)

- Did coding for project
- Made poster
- Edited presentation
- Did report work

PRATEEK SRIVASTAVA (RA1511004010721)

- Did hardware setup for project
- Finalized poster
- Did report work
- Wrote project paper for publication