**BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA**

**OFFICE OF THE MEMBER SECRETARY OF THE COMMITTEE FOR**

**ADVANCED STUDIES & RESEARCH, BUET, DHAKA**

**============================**

Application form for approval of PG. Dip. (ICT) Project proposal. All the items of the following list must be mentioned and filled in properly. **Please submit eighteen (18) Copies**. [One original and other 17 photocopies in the **full script plain paper**].

**Date:** 6.05.2019

**1. Name of the Student :** Md.Dedarul Hasan **Status:** Full - Time

**Roll No. :** 0417311011 **Session:** April, 2017

**Mobile :** +8801735078327

**2. Present Address :** Road No: 02, Kollyanpur, Dhaka-1205, Bangladesh

**3. Name of the Department:**

Institute of Information & Communication Technology (IICT) **Programme:** PG**.** Dip**. (**ICT**)**

**4. Name of the Supervisor:** Dr. Md. Liakot Ali **Designation:** Professor

**Supervisors Cell :** +88 017669247290

**5. Name of the Co-Supervisor (if any):** N/A **Designation:** N/A

**6. Date of First Enrollment in the Programme:** April, 2017

**7. Tentative Title (Block Letters)**

**DEVELOPMENT OF A LOW COST MICRO CONTROLLER BASED FIRE DETECTION SYSTEM**

**8. Background and present state of the problem:**

Fire hazards are one of the most critical problem around the globe [1]. The aftermath of fire incident leads to huge damage of properties and loss of valuable lives. According to fire departments in Bangladesh, there occurred around 2,50,000 fire incidents in the country between January 1, 1997 and December 31, 2018 where an estimated financial loss of around Tk 6,400 crore taka and loss of more than 2000 lives to the nation are reported [2-3]. Even in United States 1,345,500 fire incidents were reported which caused 3,280 civilian deaths, 15,700 civilian injuries, and $14.3 billion in property damage. So it is very important to devise a system for early detection of fire occurrences. In the literature a number of research and development work on fire detection system have been reported [4-7] where Arduino development board has been used to interface with temperature and gas sensor. When fire occurs then the system detects the emission of CO2 gas and increase of temperature above the normal condition and then it gives the alarm so that people around can get alert and take necessary measure to prevent the fire. Although arduino development board is easy to learn for microcontroller programming and there are many third party libraries available however it has a number of limitations [8-9]. It is not efficient and not industry standard. The firmware will never be optimized and will waste the memory and the system will be error prone. On the other hand embedded system development using fundamental micro controller such as AVR, PIC etc. are industry standard. Firmware will be optimized and the product will be robust and sustainable. Moreover the product size will be smaller and the cost will be much minimized.

**9. Objective with specific aims and possible outcome:**

The objective of the project is to develop a low cost micro-controller based fire detection system. To realize the objective the project has the following aims:

1. To design hardware and firmware of fire detection system
2. To calibrate the interfacing sensors with respect to available commercial product
3. To design the PCB and implement the circuitry on the board

**10. Outline of Methodology / Experimental Design:**

1. First we will explore the existing arduino micro controller based fire detection system and analyze their limitations
2. Then the specifications of the proposed system will be prepared
3. Then hardware circuitry of the proposed system will be designed implemented on the Vray board, then firmware of the circuit will be developed and the functionality of the circuit will be tested as per specifications with Smoke Sensor, MQ2 & MQ5 Sensors, Temperature Sensor, Flame Detection Sensor and Humidity Sensor.
4. Then performance of the proposed system will be compared with that of other researchers
5. Finally the PCB of the circuit will be designed and the system will be implemented there. AVR trainer borard, ATmega32, Code Vision AVR, Proteus 0.7 simulator etc.

**11. References:**

**[1]** S. Wilson, S. P. Varghese, et al. “A Comprehensive Study on Fire Detection”, Proceedings of IEEE Conference on Emerging Devices and Smart Systems (ICEDSS 2018), India, March 2018

[2] https://www.dhakatribune.com/bangladesh/dhaka/2019/03/28/16-000-fire-incidents-in-10-years; last access on 4 July 2019

[3] https://unb.com.bd/category/Special/fire-incidents-in-bangladesh-triple-in-22-years/13435; last access on 4 July 2019

[4] U. Hoefer and D. Gutmachera, “Fire gas detection,” Procedia Engineering, vol. 47, pp. 1446–1459, 2012.

[5] S.-J. Chen, D. C. Hovde, K. A. Peterson, and A. W. Marshall, “Fire detection using smoke and gas sensors,” Fire Safety Journal, vol. 42, no. 8, pp. 507–515, 2007.

[6] K. Muheden, E. Erdem, and S. Vanc¸in, “Design and implementation of the mobile ﬁre alarm system using wireless sensor networks,” in Computational Intelligence and Informatics (CINTI), 2016 IEEE 17th International Symposium on. IEEE, 2016, pp. 000243–000246.

[7] J. A. Luis, J. A. G. Gal´an, and J. A. Espigado, “Low power wireless smoke alarm system in home ﬁres,” Sensors, vol. 15, no. 8, pp. 20717– 20729, 2015.

[8] https://www.quora.com/What-are-the-disadvantages-of-Arduino; last access on 4 July 2019

[9] http://forums.trossenrobotics.com/showthread.php?6448-The-Limitations-of-an-Arduino; last access on 4 July 2019

**12. List of Courses so far taken with course no, name of the courses, credit hours, Grade, Grade Points and G. P. A. (To be verified and signed by the Tabulator).**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **S/L No** | **Course No** | **Course Name** | **Credit Hours** | **Grade** | **Grade Points** | **G.P.A.** |
| 1 | ICT 5101 | [Programming Concepts](http://www.buet.ac.bd/Syllabi/iict/iict_syll/syllabus.html) | 3 | A | 3.50 | 2.83 |
| 2 | ICT 5102 | Data Structure and Algorithm | 3 | C | 2.00 |
| 3 | ICT 5103 | Database Design and Management | 3 | B(+) | 3.00 |
| 4 | ICT 5104 | Introduction to Telecommunications | 3 | A | 3.50 |
| 5 | ICT 5105 | Data Communication | 3 | C | 2.00 |
| 6 | ICT 5106 | Computer Networks | 3 | B | 2.50 |
| 7 | ICT 5208 | Software Engineering & Application Development | 3 | B(+) | 3.00 |
| 8 | ICT 5301 | Information System and Network Security | 3 | B (+) | 3.00 |
| 9 | ICT 5309 | Optical Communication | 3 | B (+) | 3.00 |
| 10 | ICT 5100 | Project | 6 | X | - |

**Signature of the Tabulator:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. **Cost Estimate: (Invoice / Quotation must be provided for each and every item which cost Tk.**

**Tk. 10,000/- or more)**

1. Humidity & Heat Sensor 590/-
2. Smoke & CO Gas Sensor 290/-
3. PIC /AVR atmega32 200/-
4. Flame Sensor 755/
5. Bread Board/Trainer Board 2300/-
6. Cost of Materials (Component & PCB Design) 4365/-
7. Typing, Drafting, Binding & Paper etc. 1000/-

14. Approximate time (in hour) for BUET workshop facilities (if required):-------------------------------

15. Justification of having Co-Supervisor: N/A

16. Project Proposal Approved by RAC reference:

Meeting no. -------------------------Resolution No. -------------------------Date: --------------------------

17. Time extension (if any):

a) 1st Time extension (if any) up to: -----------------------------------------------------------------------------

Meeting no. -------------------------Resolution No.-------------------------Date :---------------------------

b) 2nd Time extension (if any) up to: -----------------------------------------------------------------------------

Meeting no. -------------------------Resolution No.-------------------------Date :--------------------------

c) Further time extension (if any) up to: ------------------------------------------------------------------------

Meeting no. -------------------------Resolution No.-------------------------Date :---------------------------

18. Appointment of Supervisor & Co-Supervisor Approved by the CASR Meeting No.(For Ph. D):---

------------------------------- Resolution No. --------------------- Date--------------------------------------

19. Appointment of Doctoral Committee Approved by the CASR Meeting No. (For Ph. D):------------

Resolution No. ---------------------- Date----------------------------------------------------------------------

20. Result of the comprehensive examination for Ph. D (Photocopy of the result should be enclosed)

Date :-------------------------------------- Satisfactory/Unsatisfactory.

1. **Number of Post Graduate Diploma Students working with the Supervisor at present:**

|  |  |  |
| --- | --- | --- |
| ----------------------------------------------------  Signature of the Student  ----------------------------------------------------  Signature of the Supervisor  N/A  ----------------------------------------------------  Signature of the Co-Supervisor  ----------------------------------------------------  Signature of the Director | Names and signatures of the members of the  Doctoral Committee (if applicable) | |
| 1. |  |
| 2. |  |
| 3. |  |
| 4. |  |
| 5. |  |
| 6. |  |
| 7. |  |
| 8. |  |
|  | |