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WIRELESS FLOOD DETECTION SYSTEM

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ABSTRACT

This paper aims to create a reasonable flood detection system to watch rising water in residential areas or remote locations. The towering water detection system consists of water sensing unit and data show unit. Both subsystems area unit primarily based on the ATmega 328P microcontroller and that they area unit human activity wirelessly via Radio Frequency (RF) transceivers. Additionally, several custom-made modules, including status board, charging regulator and water sensors are designed to support wet detection, power management, and information show. The aim of this paper is to reduce flood damages and to combat increasing flood risks in remote areas, particularly places while not cellular phone signals coverage. The principle of these high water detection systems is moisture sensing and communication. The goal of the paper is to devise a wireless flood detection system with low power consumption and straightforward design. The water detection system contains a transmitter system and a receiver subsystem.

Keywords: Buzzer, Flood, Radio Frequency, Solar Power, Transceiver, Wireless Communication.

I. INTRODUCTION

Due to rapid global climate change in recent decades, an increase within the severity of flood-related damages is ascertained. This causes serious devastation to inhabited properties and it also threatens communal safety, particularly residents within the coastal regions or in the areas with significant rainfalls. The Federal Insurance and Mitigation Administration (FEMA)'s National Flood Insurance Program (NFIP) estimate that total fatalities due to six inch flood are roughly $20,000 per 1,000 square foot home [1]. Although many business flood warning systems area unit presently out there, many of them area unit either valuable or unable to establish multiple water levels. In fact, some water detection devices area unit triggered by a single event and their alerts are indicated via a timer. On the other hand it is typically too late for persons to safeguard their possessions and relinquish to safe ground if their flood warning appliance is absolutely activated by a precise water level while not pre-flood warning. The goal of this design paper is to produce a affordable wireless high water exposure system that senses increasing water in existent time and determines any potential flash floods. The current propose includes a solar powered water identification system wirelessly sending device knowledge to a receiver system via Radio Frequency transceivers.

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II. LITERATURE SURVEY

There are various ways in which to find water levels and apprize flood risk. Frechette, Callaway and Trapp's appealing flood warning station used two sensors to find exact water levels and triggered a systematic instrument siren once flash flood was known [2]. National Weather Service (NWS)'s flood warning systems offers a range of towering water notification solutions which may be enforced at varied locations, including reservoirs, streams, and local communities [3, 4]. Wide selections of business water detection merchandise were additionally gettable on-line [5, 6]. Despite countless style prospects, flood recognition systems typically consist two elements – identification and communication [7, 8 and 9].

III. SYSTEM DESIGN

The solar-powered flood detection system with RF transceiver is divided into two components, transmitter system and receiver system. They are crafted to handle the subsequent style considerations: 1) Total value of materials is a smaller amount than Rs, 500/-, 2) Transmitter system needs to be self-powered with low power consumption, 3) Water sensors need to find multiple water levels, 4) Sensor knowledge will be transmitted and displayed via wireless medium, 5) A display module is needed to show water levels and transmitter standing in real time and 6) A high water warning indicator to tell user any flood risk.

Figure 1 demonstrates the high-level system style thought. A transportable transmitter system with star charging feature wirelessly sends water level knowledge to a motionless receiver system. As water raises, the mounted sensors sense acceptable water level, then the transmitter system act in accordance with and convey raw data via a Radio Frequency module and finally the receiver system interprets incoming data signal and displays period info on a dashboard. In this design, the transmitter system is powered by a star panel as well as a high-capacity metallic element chemical compound (LiPo) battery to scale back bit maintenance. A compact RF package is also utilized to reinforce wireless transmission distance.

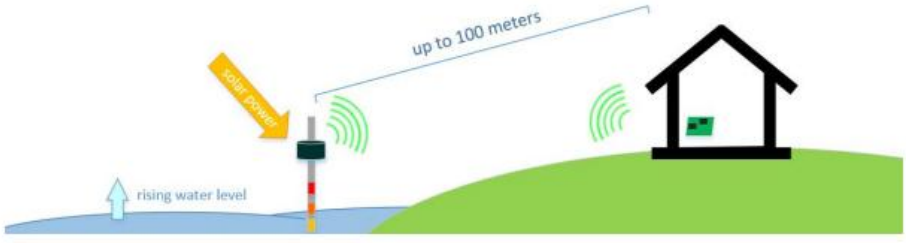

Fig. 1. Design overflow.

To reduce continuance order, the transmitter system utilizes simple water detection circuits, a low power microcontroller board, strapping Radio Frequency transceiver package and a power supervision module to manage

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distribution of harnessed solar energy. Figure 2 shows the transmitter system block diagram. Simplicity and power saving are two key focuses in coming up with the transmitter system. Therefore, microcontroller is working at the lowest clock speed and is directly sending information gathered from water sensor module, to the receiver system.

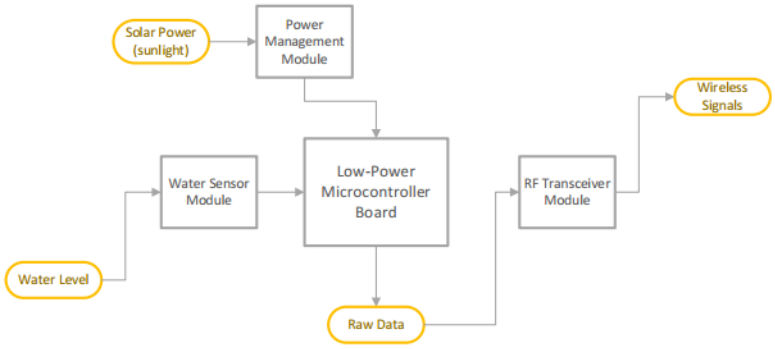

Fig. 2. Transmitter system block diagram.

Reliable data interpretation and period event notification area unit crucial to the receiver system style. Figure 3 shows the receiver system block diagram. In this part, the receiver microcontroller board processes all incoming data and illuminates corresponding light-weight emitting diodes (LEDs) on the info display to report current water level and transmitter standing. The flood caution module is activating once the system detects persistent towering water level. In addition, the receiver system automatically resets the show module as currently water level recedes below the device line.

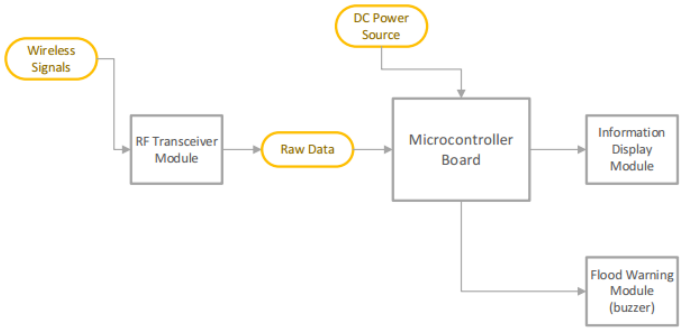

Fig. 3. Receiver system block diagram.

IV. RESULTS

An Arduino-based example is created to administrator code programs and to ascertain performance expectations. Both beta systems, as shown in Figure 4 and Figure 5, are designed victimization Arduino Uno (Revision 3) for fast setup.

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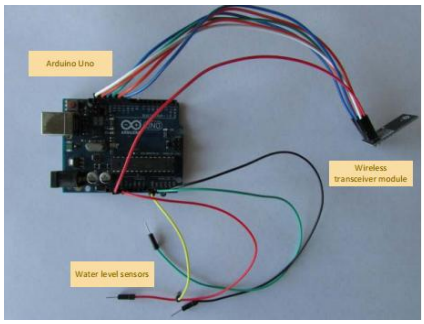

Fig. 4. Transmitter system prototype.

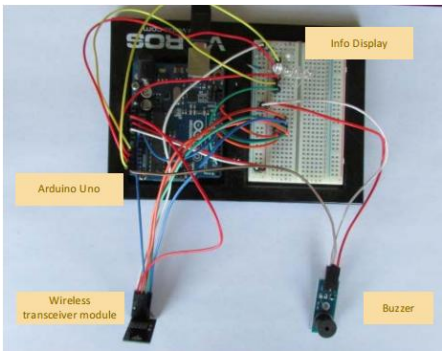

Fig. 5. Transmitter system prototype.

Prior corporal punishment the take a look at cases, the transmitter system is placed approximately thirty meters away from the receiver system with couple barriers in between (i.e., non-line of sight) and both systems area unit monitored via serial displays. Then the prototype takes a look at incoming by going over the predefined test cases. After various trials, Table 1 shows the final results for this testing.

Table 1. Results for prototype testing.

	Transmitter System Events	**Receiver System Actions**	**Results**
1	Transmitter - power off	Green LED = OFF	Success!
2	Transmitter - power on	Green LED = ON	Success!
3	L1 sensor triggered	Yellow LED = ON	Success!
4	L1, L2 sensors triggered	Amber LED = ON	Success!
5	L1, L2, L3 sensors triggered	Red LED = ON	Success!
6	All sensors triggered for 30+ sec.	White LED, buzzer = ON	Success!
7	All sensors - turn off	All LEDs except Green LED = OFF	Success!

The field testing is conducted at a far off trail with creek close to simulate the $64000 setting. Table 2 shows the results for this field testing.

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7	All sensors - turn off	All LEDs except Green LED = OFF	Success!

Figure 6 is the take a look at location.

Fig. 6. Field test location.

V. CONCLUSION

The wireless high water detection system is built to spot rising water levels and to warn any potential flood risk. With star panel and power executive module, the transmitter system is able to serve for a protracted amount of your time with minimum maintenance. The receiver system's straightforward dashboard style offers user a quick update of current water level. This flood detection model is suitable for all out of doors and indoor applications, especially for locations while not cellular phone signal coverage.

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