A DESIGN OF FARMER'S ORANGE FIELD SECURITY SYSTEM USING MICROCONTROLLER BASED DIRECT TELEPHONE TECHNOLOGY

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Abstract. *The development of security system is a positive development on reducing society's anxiety of criminal act such as theft. The security systems that are being developed today are mostly home security systems, motor cycle and cars. So far, the security system for paddy fields or agricultural fields has been minimal studied. So far, security system in farming land has been studied but in minimum frequency, such as in orange field where thefts often occur even farmers had surrounded their farming land with fences. This device made of Pir Sensor that could detect humans, it uses ATmeg328P-PU as the CPU, SIM 800L as media or device in sending messages and battery as power source. Designing this device is easy enough and affordable, this device capable in calling registered phone number in pseudecode that had been input into the program.*

Keywords : orange fild, security, safety, microcontroller.

1. INTRODUCTION

The numbers of research on house and vehicle security system has been spread widely in the market and research, in the other hand farming security system among villagers mainly on orange farmer is very limited in numbers or in other word is there isn't any of it yet. Meanwhile, orange farmers are worried on their ripe oranges that set to be harvesting for being stole by thief. So far, farmers has watched over their farming once every 3 or 4 hours daily.

Unemployment young man from Tegaldlimo, Banyuwang regency was battered after beaten by the villagers because he was caught in stealing oranges in one of orange field belongs to Supriyono, Kalipait Tegaldlimo [1]. theft of orange fruit occurred at the second time, Supriyadi, 50, from Sidorejo Wetan, Yosomulyo village. It begun when Supriyadi the owner suspicious when he realized that the harvest decreased for next day [2]. a man was presumed as thief for his neighbors farm, located in Sidorejo Wetan, Sambimulyo, Bangorejo, Banyuwangi has been arrested by Reskrim Polsek Bangorejo on Tuesday, 11 August 2020 [3].

Security is an important aspect of life. That's why, many developments of technology is designed for offer secures to protect their asset [4]. security system has been an important need for everyone who has cars, house as their belonging. It become need as highly increased criminal act among society [5]. Security is very important for everyone. Homes that are often left the owner can be used by thieves to perform the action. Therefore required an effective home security system so that homeowners can find out information if the house burglarized by thieves [6]. The vehicle's anti-theft system is a module used to protect motorcycle vehicles from theft by using three layers of security [7].

From the descriptions can be concluded, most of study discuss on house security and vehicle's security not in field or farming land security system that so far being ignored, but those needs are needed by the farmer, in this case is orange fruit, so as the need among the farmer, researcher initiate this study in designing farming security system for orange farmer using direct phone based on microcontroller security system.

2. METHODS

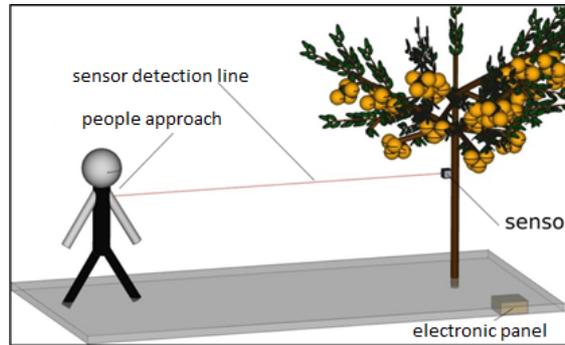Mindset of research as follow:

Figure 1. Mindset

Module of direct Telephone electronic panel placed under land surface to hid from anyone out of the farmer or outsider, the sensor placed on a branch of the tree, the sensor can detect the movement of man with perimeter 6 meter by the angle 110^0 x 70^0 after pir sensor detect human or man around it will be processed by ATmeg328P-PU as the CPU and then directed to SIM800L as the connector to dial phone number, diagram will be shown as follow:
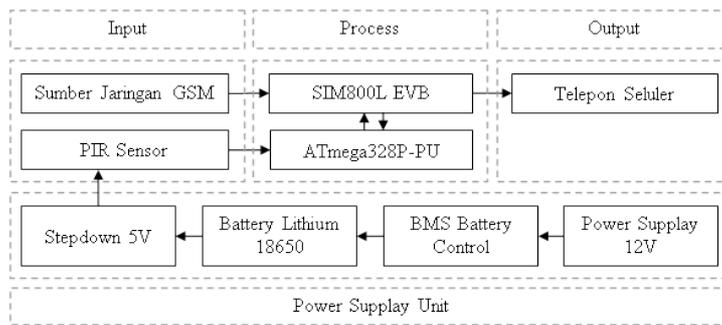

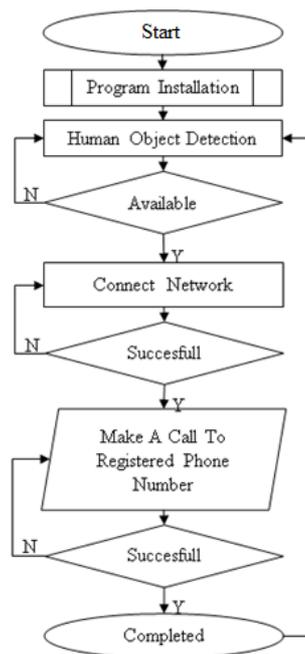Figure 2. Block diagram instrumen device

Figure 3. Flowchart of hardware

3. RESULTS AND DISCUSSION
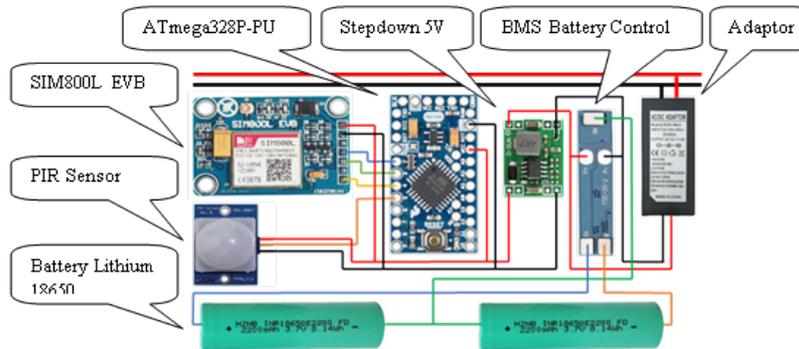
3.1 Figur And Pseudocode

Figure 4. Hardware circuit schematic

Description And Explanation:

Source of network GPRS - as main access for SIM800L so it can be connected via BTS (base Transceiver Station).

PIR Sensor - as the sensor to detect human movement with 6 metre perimeter, angle 110^0 X 70^0.

SIM800L - as a device in sending command to dial phone to the number listed in the device.

Command SIM800L - using AT Command serial sequence.

ATmega328P-PU - as CPU of security system.

Arduino IDE - with compiler AVR-GCC under Library Arduino dependency.

Connection ATmega328-PU with SIM800L - using USART Communication system.

CellPhone - as receiver dial phone sent by the instrument.

Power supply 12 V - charger to recharge battery of the instrument.

BMS Battery control - current controller in using battery Lithium and as security when the battery being charged.

Stepdown 5 V - as the function in decreasing the current from both battery to 5 V DC.

After all devices set then it is needed to be programmed as the diagram above, here the researcher used pseudocode in order to be understandable as follow:

```
#include <SIM800L.h>
SIM800 sim(2, 3, 4);
const char *number = "081234567890";
void setup(void) {
  pinMode(5, false);
  while(!(sim->begin(9600))) {}
}
void loop(void) {
  if (digitalRead(5)) {
    while (!(sim->connect())) {}
    while (!(sim->dialToNumber(number))) {}
  }
}
```

Figure 1. Pseudocode hardware on the Arduino IDE

3.2. Equations

Battery usage
1. Formula of battery using series circuit "Vtot = Vbat1 + Vbat2" (constant ampere)
2. Formula of batter using parallel circuit "Aout = Abat1 + Abat2" (constant voltage)

I = P x V
P = 20,8804 mA
V = 5V
I = 1.0 mA x 5 V
I = 104,402 mAh
Usage time = (Battery capacity/ Batteryload) – efficiency 20%
Usage time = 4500mAh / 104,402mAh – efficiency 20%
Usage time = 43 – (900 x 20%)
Usage time = 43 – 8
Usage time = 35 hours usage

Table 1. Battery consumption

Device Name	Power Consumption (mA)	Voltage Consumption (V)
SIM800L	0,7	5
ATmega328P-PU	20	5
PIR Sensor	0,1	5
Stepdown 5V	0,08	5
BMS Battery Control	0,0004	5
Total	20,8804 (because paralel)	5 (because parelel)

3.3 Working Of The System

The result of the security system design for orange fruit farmer is a an effective solution, by implementing the device, farmer doesn't need to monitor their farming land every hour or regularly in 2 and 3 hours, this device able to minimize the risk of lost by thief as what it is broadcasted by the media. The design of the device is easy enough and affordable for the components and have been enclosed and how to install it. The security system is succeed to connect the owner phone number to warn him. The researcher used pseudecode because it is easier and if it is made by the farmer, the speed in connecting to the owner phone less than 30 second, researcher didn't use short massage service (SMS) because the farmer isn't always fast in responding it, it is said that using SMS is left behind techonology. The problem here is on the usage of the battery, it is counted the battery will last for 35 hours but the fact is the battery last less of it, meanwhile in the specification of the battery on the box said can be used for 35 hours, so it is need to add an extra battery in case of longer usage, or additional battery.

4. CONCLUSION

Base on the design that has been described above so it is concluded that farming security system using direct telephone technology base on micro controller can be used and implemented effectively, if there is any human movement around the set perimeter inside the farm or trees then the device will detect him and directly send a warning to the owner phone or farmer phone less than 30 second, so the farmer will get notification there is someone inside his farming land.

5. ACKNOWLEDGEMENT

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