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FIKIRA Progress Report

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# Executive summary

This report is prepared to outline the status of an IoT based agricultural devise (FIKIRA), aimed to develop technologies that will be used on the farm to increase crop yield, by providing farmers with insight into the nature of their farmland (Soil Management), and automating routine aspects of the farming process.

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# Goals

1. Creation IoT tool that will help local farmers with their farm activities (i.e soil management).
2. Get local farmers to adapt to the tools created above in order to boost their productivity.

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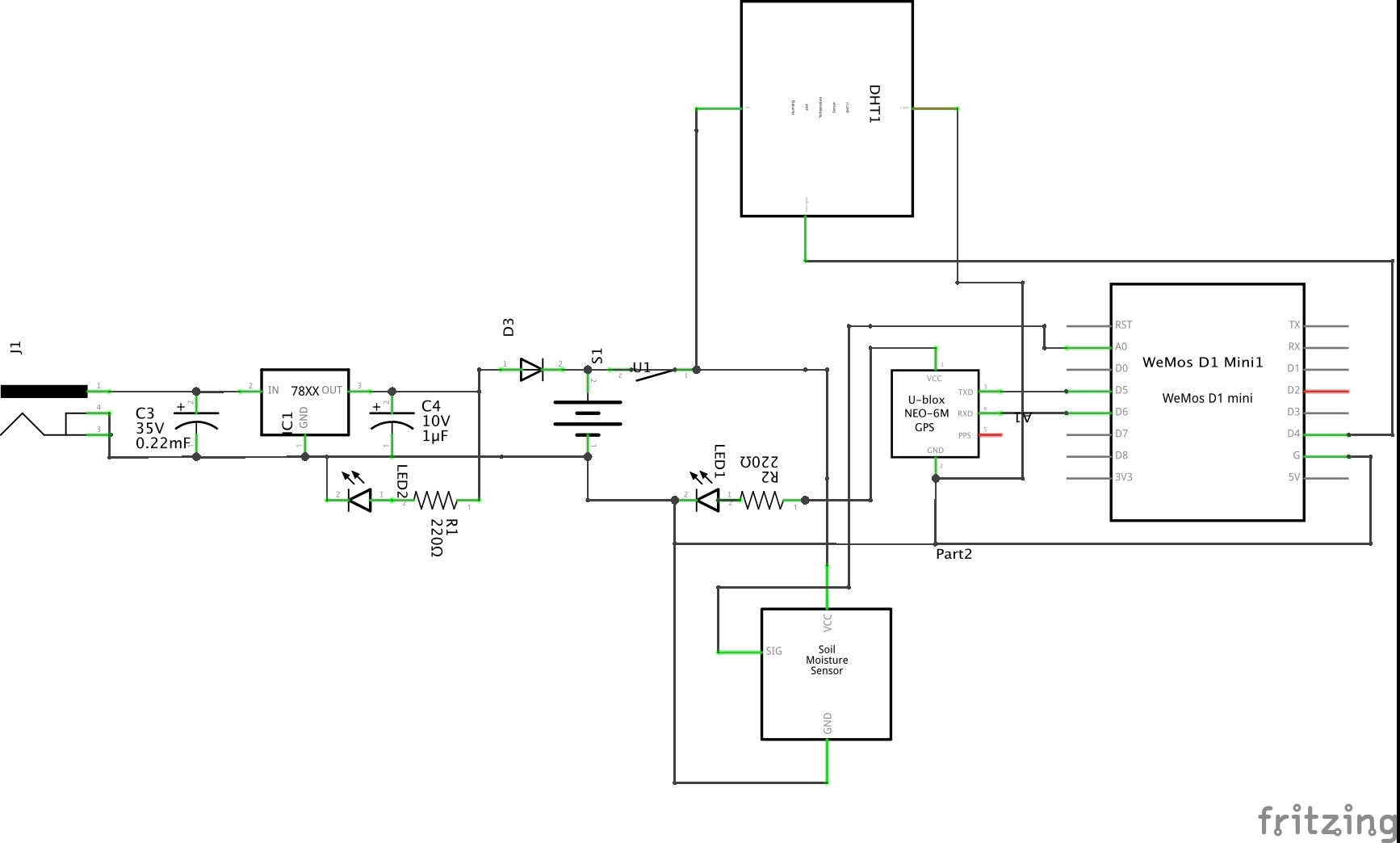
# Specifications

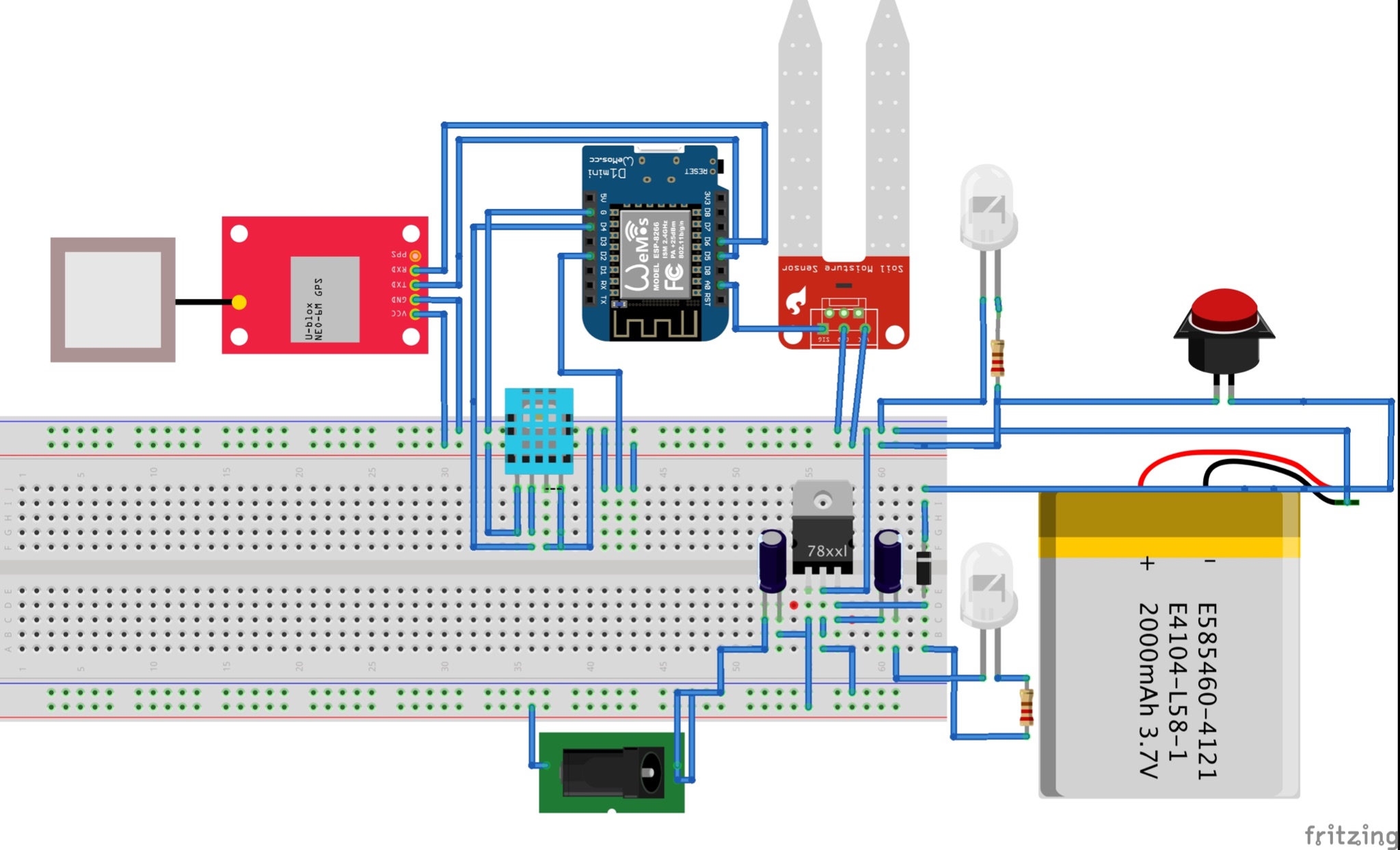
The proposed solution consists of a hardware node that will be partially buried into the ground on the farm. The node is equipped with sensors that send data regarding the state of the farm soil (moisture, soil nutrients, soil composition, e.t.c) and the environment of the farm (temperature, humidity, e.t.c) to a server.Artificial Intelligence (AI) on the server then uses the data sent by the node to give the farmer insight on his farm and crops. These insights include health monitoring, smart crop selection, water and fertilizer management. The insights are shown to the farmer on a dashboard he can view using his computer or smartphone

**Milestones**

| **Milestone** | **Plan** | **Progress** | **Problems**  **&**  **Solutions** |
| --- | --- | --- | --- |
| **Ideation and purpose of the project** | The main idea and purpose of the project will be stated to the project team members and the time members will go and brainstorm the idea | * Both The Team members brainstorm on the idea and some come up with suggestions and additional ideas | No problem in this stage |
| **Architecture,IOT core,and firmware selection** | The microcontroller,modules and sensors to be used will be selected to have an optimum design.  Also,firmware language will be selected as well as the IoT cloud. | * The most common and optimum microcontroller is selected(ESP8266),going for wemos mini being it with small size and having dual core processor,and also wifi and bluetooth which is the best for iot applications. * DHT11 temperature and humidity sensor was selected * Soil moisture sensor was selected * Neo 6M GPS module was selected * Arduino Firmware was selected * Ubidots IOT cloud was selected for collecting,visualizing and analyzing our data | * Some issues with selecting firmware language,looking at micro-python and arduino firmware,but at last embedded C/C++ (arduino) was selected being the best for memory and speed applications * Selection of iot core to use was a little bit confusing, which to use among AWS IOT,Azure,Thingspeak,ubidots,but at last select ubidots being the best for our project budget and data visualization. |
| **Software Development** | An embedded software will be implemented using C/C++ on arduino IDE,that will be compatible with espressif boards (ESP32/ESP8266) for the project,and make all the modules work with the software | * The software was gradually progressing, getting libraries to work with the wemos mini * Wifi connection function was developed * Connecting the software with ubidots through the Https protocol was achieved. * Send temp function was developed for sending Temperature,Humidity and soil moisture level to ubidots iot core * The Send Location function was successfully developed to send the current position of the device to ubidots. | * There is an issue with the GPS module library,some did not support our device version.due to this,some libraries have to be edited to have one that is compatible with our device version |
| **Hardware testing and debugging** | The wemos mini board will be connected with the sensors and modules and send data to the IoT core. | * The wemos mini board successfully get connected to internet and ubidots * The temperature and humidity sensor worked and weather readings are successfully sent to ubidots * The soil moisture sensor successfully send soil readings to the iot cloud * GPS module successfully send position data to ubidots | * Wemos mini pins out are quite complicated, the datasheet of the esp8266 have to be used * DHT11 readings was not accurate,the duration has to be manipulated to 5 secs to allow the sensor give accurate reading * Neo 6m GPS module uses serial communication(UART) to send gps data to the processor ,but unfortunately refuses to work with wemos mini through hardware serial,because the host(computer) and the esp are connected through hardware serial,software serial have to be used to solve this issue. |
| **Complete prototype implementation** | A complete prototype of the project will be developed,together with a rechargeable battery system to have constant power supply for the system | * Power supply was designed and components as well as suitable rechargeable battery was selected using there datasheet * Components,connectors,sensors and modules were mounted and soldered on a vero board to have a complete system(female connectors were used so that the wemos mini will be mounted on it in order to ease removing and replacements | * Casing issues were raised due to unavailability of 3D printer,and Patrick boxes were used. |

**Circuit diagram**

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