

HASSAN  
ALMARHOON **EE**

HUSSAIN  
ALMUZAYIN **EE**

AHMAD HARIRI **ME**

HUSSAIN  
SULAIS **ME**

ABDULLAH  
ALSHAHI **CIE**

HUSSAIN  
MAHROOS **ISE**

## BACKGROUND

### Project Objective:

To detect corrosions, defects, and leakages with their locations and intensity throughout underground vertical pipelines of rig wells by combining both methods of Magnetic Field Leakage (MFL) and Optical Sensor Array (OSA).

### Specifications:

- Temperature Tolerance  
**68 °F -500 °F**
- Pressure Tolerance  
**0.10 MPa - 44.95 MPa**
- Speed  
**5.10 m/min**

### Constraints:

- Rig Narrow Size  
**30.48 cm (12 in)**
- Power Loss
- High Temperature  
**194 °F**
- High Pressure  
**30 MPa**

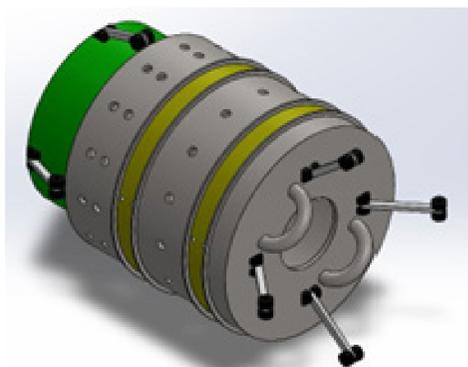
### Project Impact:

Our project, Defects Detection Tool (DDT), aims to utilize more than one method to detect the corrosion of the pipe. By using the MFL and the OSA sensing systems, we ensure a reliable and flow less readings.

## PRODUCT FORM

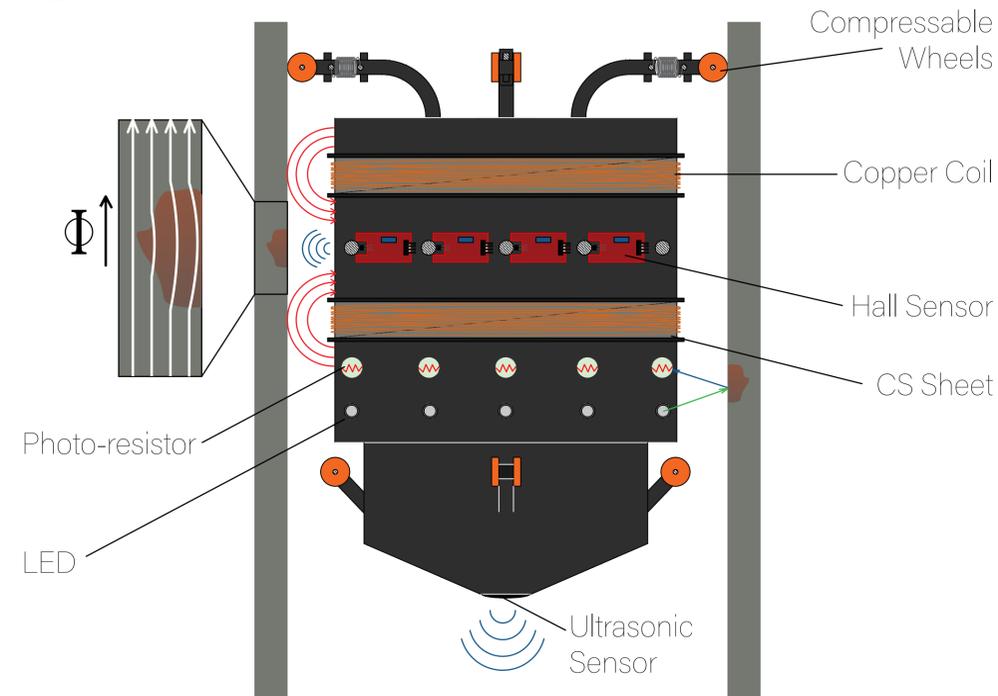
### Detection Unit:

- Dimensions:  
**23.5 x 23.5 x 34.0 cm**
- Weight:  
**2.45 Kg**
- Material:  
**ABS**

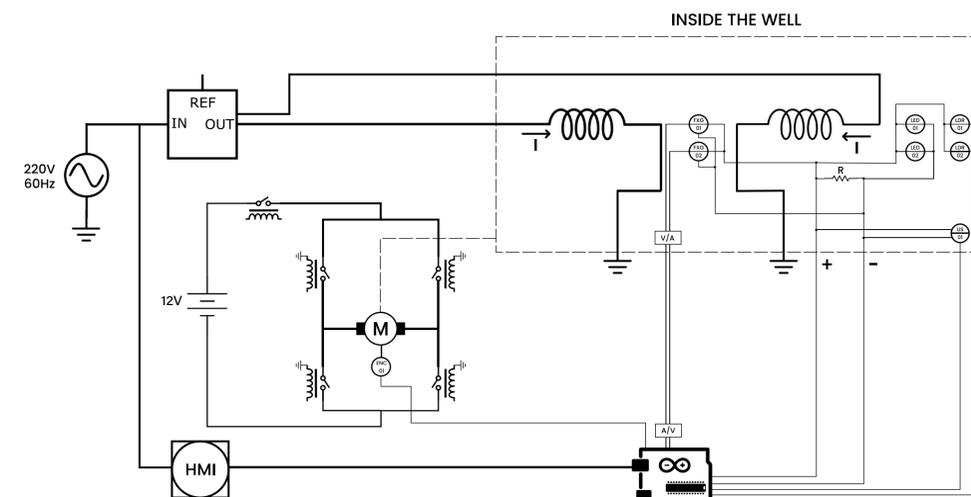


## PROTOTYPE DESIGN

### Detection Process:

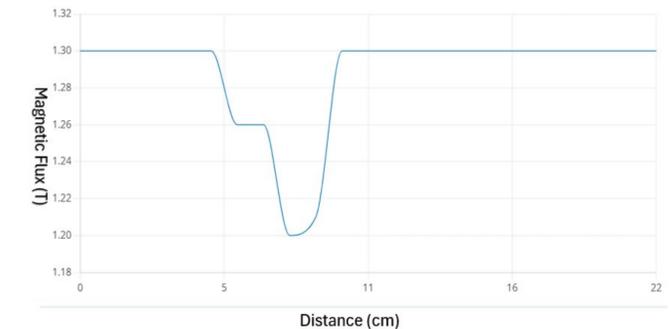


### Electrical Connections:



## VALIDATION

- To solve the problem of temperature we used **ABS** filament for the 3D printing that can tolerate up to **500°F**.
- We solved the pressure constrain by using the ABS material that can tolerate up to **44.95 MPa**.
- We designed our prototype to be fixable in the narrow size of the pipe and in wider pipes also.
- By using the motor we got the desired speed of the prototype to reach up to **5.10 m/min**.



## CONCLUSIONS

- Power losses due to large distances are reduced by moving the motor and control parts above the ground.
- Signal losses are avoided by converting the voltage readings to current and then convert back to voltage before the controller receive it.
- Detection unit is suitable to work under teamperatures ranging from 68 °F -500 °F since its material is ABS.
- MFL and OSA systems succcefually reads the magnetic field induced in the pipe to detect corrosions.
- The system succcefually determine the location for each defect with its intensity.